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GEOLOGY AND MINERALOGY

OF

GEORGIA,

WITH A PARTICULAR DESCRIPTION OF HER RICH

DIAMOND DISTRICT;

THE PROCESS OF WASHING FOR DIAMONDS, THEIR PRICE AND
MODE OF CUTTING AND SETTING;

HER

Gold, Silver, Copper, Lead, Iron, Manganese, Graphite, Kaolin, Coal, Fire-Clay, Mica, Corundum, Slate, Marble, &c.

BY

DR. M. F. STEPHENSON,
FORMERLY ASSAYER IN THE UNITED STATES BRANCH MINT; A PRACTICAL
ENGINEER IN GOLD, SILVER, AND COPPER MINING FOR FIFTY
YEARS; AUTHOR OF TWO WORKS ON ETHNOLOGY,
BIOGRAPHY OF DE SOTO, ETC.

ATLANTA, GA.:
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PREFACE.

THIS brief treatise on the Geology of Georgia is necessarily imperfect and unsatisfactory, in consequence of the impossibility of condensing the vast amount of valuable matter into so small a space. To do justice to the subject would require at least one thousand pages.

No territory of equal extent in any part of the world can compare with Georgia in the *quantity* as well as *quality* of its metalliferous ores, the great diversity of its useful minerals, and particularly her inexhaustible mines of iron, gold, silver, copper, lead, manganese, talc, kaolin, precious stones, and the matchless *diamond.* The object of the author is to give a general outline of the geology of the state with its most prominent mineralogical, manufacturing *and agricultural* features and capabilities, fine climate,

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and other advantages, which all immigrants and citizens are desirous of knowing before they risk their lives and fortunes on vague rumor.

The legislature of Georgia, from a mistaken notion of economy, have for ages persistently refused to appropriate a dollar for a geological survey of the state, which would develop her mineral wealth equal to more than doubling the value of her real estate amounting to hundreds of millions of dollars, besides bringing into our country an equal amount of capital and skilled labor, by giving the necessary information to those abroad who wish to know the adaptation of this country to their pursuits in life before they will come. Our proud and rich old state, by this culpable neglect, is left a quarter of a century behind the age, and a blank in science!

We are under obligations to Colonel A. G. Butts for the use of his valuable map of the state, which we have confirmed by actual visits to the different localities, where new counties have been made, and corrections in various sections and railroad lines. No more valuable map has ever been offered to the public than his.

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GEOLOGY AND MINERALOGY OF GEORGIA.

CHAPTER I.

INTRODUCTORY REMARKS. — REFERENCE TO THE METALLIFEROUS ORES, AND AGRICULTURAL RESOURCES OF THE STATE. — HER GEMS AND PRECIOUS STONES. — THE SCUPPERNONG GRAPE, MUSCADINE, AND MUSTANG OF TEXAS. — DISTINCT SPECIES. — HISTORY, &C.

BY request of many friends of progress and humanity, I have written a brief history of the geology and mineralogy of Georgia, which, to be properly understood, requires a preliminary account of the formation of the whole continent, showing it to have been cotemporaneous with that of the eastern; also, its topography, its water power, metalliferous localities, and mineral treasures most useful in the arts; its common school system, internal improvements, and, above all, its present and prospective agricultural resources, for the benefit of emigrants from the more northern and western states, and also for information to European immigrants, who wish to settle here and become permanent citizens, and help develop the inexhaustible resources and wealth of the Empire State of the South.

There is no country in the world, of equal area, that can compare with Georgia for pleasantness of climate, for diversity and quality of metalliferous ores and precious stones — from gold, silver, and iron, to the amethyst, topaz, and brilliant diamond.

The water power is superior to other sections by reason of the peculiar configuration of this part of the continent, the rivers and streams, running at right angles to the strata or mountain chain, producing millions of falls and rapids. The soil is not only diversified, but its fertility is equal to the demands of the most extended system of agriculture — from the growth of cotton or wool to the cereals, grasses, and all kinds of fruits common to the temperate zone.

In North Georgia, the apple, pear, and quince attain their greatest perfection. The peach and grape are valuable and certain crops, the latter of which (of one species) yields fabulous returns to the farmer and vintner, with a trifling outlay of money or labor. This species is the matchless Scuppernong, first discovered on Scuppernong River, near Albemarle Sound, in North Carolina, and indigenous, being found only in that section, in South Carolina, and Georgia. It will not grow north of thirty-five degrees north latitude, *nor at an* altitude of fifteen hundred feet beyond *thirty-four degrees.* Neither will it live in any climate where the thermometer falls below ten degrees in winter.

Its great value consists in its entire freedom from *rot* or *mildew*, or being killed by frost, as it does not bloom till about the middle of June, when all other grapes are nearly grown; consequently it is in no danger of hybridizing, always bears a full crop, needs no pruning nor expensive trenching of the ground, and its yield is enormous. The must from this grape, when properly cultivated, will weigh, on Œschle's scale, ninety-eight degrees of sugar. The official statement of the department chemist in the Agricultural Bureau (Dr. Antisell) says that the wine capacity of this peculiar grape equals that of any other native grape, reaching fourteen per cent. of alcohol. Messrs. Garrett & Co., of North Carolina, say they have wine made from this grape which bears comparison with the very best Johannisberger, now selling in New York at eight dollars per gallon. "We have five acres planted, from which we made, last season, six thousand gallons of wine,—both red, white, and sparkling,—and know older vines which have not missed a crop for sixty-five years."

The "Walter Raleigh Vine," on Roanoke Island, which was three inches in diameter in 1610, now covers *one acre and a half of ground*, and last year produced three thousand dollars' worth of wine.*

* *See Southern* Cultivator, vol. xxviii. p. 441.

One vine in Tyrrell County, west of Albemarle Sound, last year is said, on good authority, to have produced over two thousand gallons. It is a natural sparkler, and admirably adapted for the manufacture of that kind of wine. The one on Roanoke Island is described, in history, as the "Lord Raleigh Vine," by Captain Hackluyt, who commanded an expedition sent out by Sir Walter Raleigh, in 1608 and 1609, being then in full bearing, and about as big as his leg, and so heavily loaded with delicious fruit as to cause him to notice it so particularly, not having seen any grapes of the kind in any part of Europe or Asia. Whilst all other grapes grow in bunches, these grow in clusters of twos and threes, or more. Both this and the Mustang, of Texas, are rampant growers, and rapidly become remunerative. Some of the varieties of this *nameless species* do not ripen till the middle of October, lengthening the vintage season for two or three weeks — adding greatly to its value. Dr. S. B. Buckley, of Austin, Texas, has the honor of being the first author who gave public notice of the Mustang grape of Texas, in a communication to the Academy of Natural Sciences, of Philadelphia, in 1861. He called it *Vitis Mustangensis*. Many of the varieties of the Mustang, like the Muscadine, are worthless as wine grapes; but in Texas thousands of persons are now cultivating the Mustang, not only for table use, *but for profitable* wine-making, and large quantities of good wine were manufactured from it, during the last two years, from the wild grapes of the swamps and jungles. One man, near Galveston, has a white variety, which he considers superior to any of his large collection of different kinds of grapes. Both this and the Scuppernong are such rampant growers that they make the best of stocks for grafting, adding greatly to their bearing qualities. It can be trained on the usual arbors, but prefers trees to run upon. Like the Banyan, whenever the branches fall to the ground and get covered up in summer, they readily take root, and form a new trunk or stem to help furnish food to the growing plant. Consequently it is all-important to attend to this habit, in either the Scuppernong or Mustang, in cultivating a vineyard, lest the crop be deficient for want of sufficient nourishment. The previously described vine on Roanoke Island is said to have over forty stems, independent of the mother trunk. It will not grow from the cuttings, like other grapes, but must be rooted by covering up the branches in August. This species and the Mustang are classed, by most botanists, as varieties of the Muscadine (*Vitis rotundifolia*); but Dr. Buckley contends that the Mustang and Muscadine are distinct species, but the Scuppernong is only a *variety*. This reasoning is hard to reconcile with facts. It is more consistent to class the three species as a subgenus, for the fruit is not produced from the current year's growth, *as is the case with all other grapes*, but on the spurs of one or more years old. Again, the Muscadine is *diœcious* whilst the Scuppernong is *monœcious*. This marked and striking difference characterizes them as *distinct species*, and their producing the fruit in clusters, when all other grapes in the world grow in bunches, constitutes another difference, which is unmistakable and as strongly marked as that of any two species either in the vegetable or animal kingdom.

The Scuppernong, with its varieties, is unquestionably the most profitable grape for wine ever cultivated in this or any other country, requiring no skill, science, or practical knowledge to grow or make the wine, and, at the same time, brings its benefits within the reach of the *million*. The wine, of equal age, will compare with the best Rhine wine in Europe.

When first discovered, the "Lord Raleigh Vine" was in full bearing, and the fruit ripe the middle of September; and the winter after, Captain Hackluyt sent several cuttings and layers to Queen Elizabeth, but they all perished in the cold climate of England. Governor Lane and Captain Phipps also gave a full description of it to Sir Walter; but the name was not known till 1840, when Dr. C. G. Wyche, of North Carolina, gave it the name of "*Scuppernong*," from a river of that name emptying into Albemarle Sound, *in Tyrrell County*, and on the banks of which it grows, *in the woods, in great* abundance and luxuriance.

This most valuable grape is now being extensively cultivated in the Carolinas and Georgia. Drs. C. G. Wyche and A. J. Butner are distinguished and reliable authority, not only on the culture of this valuable and peculiar grape, but on making the wine. Their experience extends over a period of half a century; and, notwithstanding the wonderful results of their labors, the deep-rooted prejudices of vintners and others prevailed over the most glaring facts, and this king of grapes has been neglected for two hundred and sixty years, and the worthless European varieties purchased at high prices, and attempted to be cultivated in a climate wholly unsuited to their nature and habits.

The Mish, Thomas, and Flowers are varieties of the Scuppernong, the two former much the best; but the Flowers, ripening the first of October, is more valuable, in consequence of greatly lengthening the vintage season. This gives the vintner a decided advantage over all competitors. Another great advantage is, their never being subject to any disease or being killed by frost, enabling him to engross the market without fear of successful competition. Mr. Van Buren, in his valuable book on the Scuppernong and its Culture, says his vines, at five years old, gave him half a bushel each; at six years old, three bushels each; and, at ten years, he had seen them yield from thirty to fifty bushels each, equal to two thousand gallons of wine per acre, and increasing for years by cutting out the alternate rows as they become crowded.

Owing to the high temperature and long seasons of the Carolinas and Georgia, it is difficult, if not impossible, to make a good wine from any European or American grape brought from higher latitudes, in consequence of the large amount of tartaric acid, and their ripening too early, when the temperature is so high that an undue fermentation produces a sour wine by no means suited to southern tastes.

The late Dr. William Hume, of Charleston, S. C., was one of the most distinguished practical chemists in this country, and made numerous experiments on the wines of South Carolina and Georgia, but was compelled to admit that it was impossible to make a good wine, in the extreme south, from any grape, except the Scuppernong and its varieties, because most of the Carolinas and Georgia, Alabama, and all of Florida, Louisiana, and Texas, are situated south of the isothermal line which bounds successful grape culture in Europe. The doctor's experiments not only applied to the analysis of the wine, but embraced a varied course of fermentation, in situations from the surface, and common cellars, to one of forty feet in depth; yet all would not do. The discovery of the Scuppernong obviates all these expenses and difficulties, and opens a new field for wine-making far *superior to anything* ever before known, and, when *in the w* properly cultivated, will produce a complete revolution in the traffic of that important article of commerce, and, of late years, of household necessity, being a handmaid of temperance, and adding to the health of man. It was this great mistake of our ancestors, and even our present neighbors, which has caused the continued loss, for the last century, of our orchard and vineyard crop. The southern people are remarkably credulous, and easily imposed upon, and will continue to purchase northern fruit trees and grapes, without reflecting that they may be valuable in the North, and utterly worthless here. Heretofore the people of the South have utterly failed to realize their expectations simply because God placed each species of plant and animal in the province adapted to its fullest growth or development. This is proved every year in the apple. Millions of dollars are expended in the purchase of northern varieties, which have always proved a total failure, in consequence of not being adapted to our climate. They ripen too soon, and rot. Of late years a better spirit prevails, and investigation forces the conviction of the necessity of a change in our system of agriculture. This necessity has forced thousands of southern farmers to adopt the culture of southern seedlings, which are becoming not only great favorites, but found to be capable of indefinite improvement. The Shockley apple is a seedling of Hall County, Georgia, which, as a keeper, has no superior, and, though not a first-class fruit, is equal to the wants of the mass of mankind. The Buff, the Limber-twig, the McDowell, the Tender-skin, and the Chapman Crab, and others, will not only furnish the table, but will yield a cider which, by being clarified and impregnated with carbonic acid gas, will make a champagne wine that but few can detect from the genuine, and will satisfy the tastes of most ordinary men.

It is the attention of our farmers and vintners to these immutable laws of God that will enable them to compete with any part of the world in the production of apples, pears, and other fruits, and defy competition in grapes and wine-making.

Owing to the positive freedom from rot and mildew, and exemption from frost, the Scuppernong grape enables the vintner to make wine at one half the cost of any other grape cultivated, either in Europe or America. The apple crop of North-east Georgia will, in a few years, become equal to the supply of all the South, and a surplus for shipment to the West Indies and the Middle States.

The State of Georgia is situated between latitude 30° 21′ 39″ and 35° north, and longitude 81° and 84° 53′ 38″ west from Greenwich, or 3° 46′ and 7° 39′ 26″ west from Washington city. Its length is 372 miles from north to south, and 256 miles from east to west; *containing 63,397½* square miles, and 40,574,400 acres.

It is bounded on the east by South Carolina, by the Atlantic Ocean and Florida on the south, by Alabama on the west, and Tennessee and North Carolina on the north, and contains 1,185,637 inhabitants.

Georgia was one of the thirteen original states that inaugurated the revolution, and secured to us independence from British tyranny.

The southern part of Georgia is intertropical, and, in many parts, healthy to all persons who have become acclimated, and understand the necessary precautions to secure health. For consumptives, no country, except Florida, is better adapted or suited to their condition, the temperature or atmosphere of which is calculated to restore diseased lungs to a healthy condition. All persons in the Northern States who can avail themselves of these advantages should do so by spending their winters here, at least in the incipient stage of the disease, for we opine, from long observation, that the disease in its advanced stages cannot be cured; but in its first stages the effect of a southern climate will create renewed secretions and consequent sloughing off of the morbid excretions which clog the free circulation of the blood and the healthy action of all the respiratory organs of the lungs and liver. It is a want of knowledge of these facts which causes so much unnecessary suffering in the human family.

CHAPTER II.

FORMATION OF THE AMERICAN CONTINENT. — THE AGE OF THE DIFFERENT GEOLOGICAL SECTIONS OF GEORGIA, AND THEIR RELATIONS TO OTHER COUNTRIES.

WE will now devote a few pages to the formation of this section, and show its geological relation to the neighboring states, and then give, in detail, its mineral resources, water power, timber, and agricultural capabilities, and present status, to comprehend which it is necessary that we give a brief outline of the formation of this continent; showing the gradual development of all its grand topographical features, from the first germ or nucleus north of the great lakes to the southward and westward, until the present epoch, when the Atlantic Ocean bounds it on the east and south, and the great Pacific on the west. These limits, however, are yearly and silently being pushed outwards by molecular force, and the vast increase of coral plantations, with alluvial sedimentary deposits from the elevated plateaus and mountain ranges above. When the first *dry land* appeared above the ocean level, north of Lake Superior, and extending north-eastward to Labrador, and north-westwardly to the Arctic Ocean,—a distance of more than two thousand miles, in an irregular crescent form, holding Hudson's Bay in its arms,—with a breadth of three hundred to four hundred miles,—then all the south and west was a deep sea, except a comparatively narrow strip from Nova Scotia and New England to Georgia, which was shallow water. No mountains then lifted up their heads above the horizon to break the monotony of the sublime and lifeless scene. Then no animals or fishes moved on the land, or swam through the waters — all was one vast solitude.

The next cataclysm or volcanic irruption upheaved the mountain chains,—the Appalachians, the Andes, and Nevada, cotemporaneously with the Himmalaya, the Alps, and other leading ranges of Europe, Asia, and Africa,—which now rose above the surging waters, and gave visible form to the eastern and western continents. It was during this time that the great fields of plutonic and stratified pyrocrystalline rocks in North Georgia and north-eastward, for a thousand miles, were brought above the water. Then the great west was a deep sea, including several counties in North-west Georgia, and nearly all of Tennessee and Alabama. During the long succeeding era of repose called the carboniferous system, the extensive coal-fields were formed, together with their superincumbent sandstones, shales, and limestones — equal to the wants of man for millions of years.

In this age, or rather cycles of ages, the coal-fields of North-west Georgia were formed. The next great volcanic epoch completed the present configuration of the American and eastern continents, by elevating their various mountain ranges yet higher, to their present height, or nearly so, forming their river-beds, and adding immensely to the area of dry land, particularly in Europe, Australia, and America. This force elevated the former sea-bed, and brought those vast coal-fields in the United States and elsewhere above the water in many places, so as to be available to man's uses when the earth's temperature became adapted to his advent. The deep basins of that ancient sea now form our great lakes of fresh water; and the beautiful Ohio, the Tennessee, with the mighty Mississippi and her hundred tributaries, first furrowed out their present channels, and checkered the landscape, and rendered it a fit abode for man and animals, and gave to it its present topography.

The vast tertiary region of North America, from a mere point in New England, gradually enlarges and widens, until it reaches one hundred and fifty miles broad in Georgia; and when you pass the great alluvial belt of the Mississippi, its area becomes immense, and its relative position, on the plains and mountain slopes of the Rocky Mountain range, with its thousand intermontane valleys and basins, which *are now found* to have been vast ancient sea-beds, *upheaved by* volcanio action, and now form an extended, rich, and habitable territory, capable of sustaining scores of millions of inhabitants, — all prove, beyond a doubt, that this vast range, for more than a thousand miles wide and three thousand long, was elevated above the sea level, long subsequent to that of the Appalachians.

Sir Charles Lyell's opinion that the mountain chains were elevated by gradual uniform force, or molecular action, is not sustained by facts. Everywhere we find evidences of the most violent volcanic action in the wide-spread disruption of the strata for thousands of miles, which could not have been effected unless by sudden convulsion. Another equally strong proof against his theory is the *extinction* of all the animal and vegetable species of each cataclysmal epoch.

The recently revealed geology of the Rocky Mountains, by Professor Hayden, confirms the above opinion, and makes the elevation of that vast country to have been since the deposition of the first tertiary group, whereas that of the Appalachians must have been long anterior to the silurian age.

The oldest sedimentary rocks, resting on the plutonic axis, are highly crystallized, non-fossiliferous, and perfectly stratified — alternating with metalliferous veins, or rather layers, of iron, gold, silver, lead, and other metals, embedded in a matrix of quartz (with *rare exceptions* of lime and barytes), which were evidently deposited *cotemporaneously* with the enclosing strata, and not formed by subsequent "segregation," as generally taught.

The strongest proofs of this fact are, that these *miscalled* segregated veins have no defined *walls*, as miners term the sides of a true vein; and another positive proof is the fact that they always have the same "strike and dip" with the enclosing strata, and the gold in that class of veins is of great purity, whereas the gold in all "true veins" is always alloyed with other metals.

The formation of micaceous, talcose, and chloritic slates of the metamorphic or primary non-fossiliferous system is essentially different from the Taconic and Silurian group. In the former the rocks are highly crystallized, and devoid of any trace of animal or vegetable life, whereas the strata in which the "true" and segregated veins of the Taconic group are fossiliferous, and evidently formed by the erosion of the older rocks. At one point a stratum of quartzite ten thousand feet thick and thirty miles long crops out, composed of corallines almost entirely, is traversed by gold veins, running nearly at right angles to the plane of stratification, which, of course, were formed by volcanic agency long after the *deposition* and hardening of the strata through which they run; and proving another fact, which is new in science, that *these gold veins* were made after the introduction of animals on earth. This is an important fact, and settles the question that there was a time, extending through millions of years, when the earth was totally devoid of life; and another fact, that only the lowest zoöphytes were first introduced, and by regular gradations others were put on it as its temperature became suited to their natures and habits, until vertebrate animals and monocotyledonous plants were simultaneously placed here during the latter part of the carboniferous age, and during the tertiary epoch and alluvial, man and all lung-breathing animals, and plants suited to their wants and sustenance, were placed in their respective provinces to perfect the plan of God's creation.*

At least two thirds of all Europe and North America have been elevated above the sea level since the latter part of the tertiary group was deposited, showing that nearly all the south and west is of very recent origin, geologically speaking.

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* It is not until the pliocene epoch that we find the remains of mammalia, though Lyell says that specimens of fossil quadrumina were found, in 1837, in the cretaceous and eocene formation in England and France, consisting of parts of an orang, baboon, and monkey.—*Lyell's Prin. Geol.* p. 141.

The evidences of the remains of man are by no means satisfactory at an earlier period than the tertiary: though footprints are said, on good authority, to have been found in the *underlying* shales and slates of the coal-measures of the carboniferous *system* of Pennsylvania.

CHAPTER III.

Geographical Divisions of the State. — Fossil Remains in the Tertiary and Cretaceous Formations. — "Lower or South Georgia." — Climate. — Seaports. — Railroad Communications between Savannah and the Great West and North. — Brunswick.

The State of Georgia is divided into three great geographical divisions, called Lower, Middle, and North Georgia. It is also divided geologically into the alluvial, tertiary, cretaceous, silurian, taconic, metamorphic, and plutonic. The first embraces the coast-line, between the sea islands and the first escarpment of the pliocene, and resting at some ten to twenty feet on a sandy post-pliocene formation. It is gradually extending its limits, and will, in time, become a very extensive region for rice culture. This formation contains but few fossils, except the vertebrata which constitute the great feature of the "fish-basin" of Charleston Neck, in South Carolina.

In the alluvium of all this coast, from Georgetown, S. C., to the St. Mary's in Florida, there are unmistakable evidences of a subsidence of the land at a very recent period, geologically speaking. This is evidenced in excavations at various points, where the stumps of trees of the present forest growth are found standing *in situ*, from six to eight and ten feet below the surface. That catastrophe evidently destroyed all the animals within its range, which must have been very numerous, from the recent discoveries on the peninsula of Cooper and Ashley Rivers in South Carolina, and at four other points in Georgia. This formation is rendered of great interest in consequence of these discoveries, and the increasing demand for the phosphates found in it, now so much needed in restoring the exhausted and worn-out lands of these two states, and also as an important branch of foreign commerce, which is now only in its incipiency; and yet, during the last year, the demands of England alone reached twenty thousand tons. Every indication strengthens the opinion that these valuable deposits of fossil phosphates are of considerable extent, and by no means confined to South Carolina. From the north-western limit of this formation to the buhrstone there are but few fossils. The land rises gradually for about thirty miles, when its altitude reaches twenty feet. Here the land rises abruptly about sixty feet, and forms another plateau for twenty miles, where another escarpment occurs of about the same height, clearly marking the ancient shore-line of the ocean at those two periods.

The eocene formation is bounded on the north and north-west by the cretaceous and primary non-fossiliferous formations, the former of which is very extensive in Alabama, and extends into Georgia as far as the Savannah River, near Augusta, only appearing at the surface at one point from there to Saundersville, in Washington County; thence the southern edge of this group zigzags to Pataula Creek, above Fort Gaines, on the Chattahoochee River. The northern terminus runs irregularly with the metamorphic rock until it nearly intersects the former line, forming an acute triangle, its base resting on the Chattahoochee, near Columbus. It underlies part of Clay, Randolph, Muscogee, Richmond, Quitman, Stewart, Chattahoochee, Marion, Schley, Webster, Taylor, Macon, Houston, Crawford, Terrell, and Washington Counties. This formation is of limited extent, compared with Alabama and other South-western States. It rests on the primary non-fossiliferous system on the north, and that extensive formation alternates with the plutonic rocks of the Appalachian chain of mountains, after stretching from Nova Scotia south-westward for more than a thousand miles, to Georgia, where it sinks beneath the metamorphic sediments of the azoic age. It is in this plutonic and pyrocrystallized metamorphic rock that the rich and extensive gold-fields of Georgia are situated.

But to return to Lower Georgia. It is on the coast-line or tide-water districts, including numerous sea-islands, that the celebrated "sea-island cotton" is grown, which has become such an indispensable article in the manufacture of the finer cotton fabrics. It cannot be grown to perfection anywhere else than between Florida and Charleston, South Carolina, owing to the peculiar tendency of atmospheric currents which prevail, and bring the necessary plant-food for that particular kind of cotton.

The next agricultural production which gives character and commercial importance to that section is rice, which yields large crops, and is destined to contest for the supremacy with cotton, sugar, and tropical fruits, the culture of all which is so profitable. Since the freedom of the slaves the culture of rice has fallen off more than cotton, only twenty-eight thousand casks having been sold as the production of 1870. South Carolina made thirty-six thousand, Louisiana twenty thousand, and North Carolina but three thousand, while Florida, Alabama, Mississippi, and Texas all give the meagre crop of less than one hundred thousand casks. With proper culture, in a decade of years, the same country will, in all probability, yield two to three hundred thousand casks.

This region, embracing a large portion of the tertiary district, is the home of the "live oak," so indispensable in ship-building, and the long-leaf pine (*Pinus palustris*), which furnishes such vast quantities of lumber for architectural and other purposes for this country and Europe. It covers a breadth of from one hundred to two hundred miles from the sea-shore inland, and extends more than one thousand miles, from Virginia to Mexico.

It is from this inexhaustible field that the world receives her stores of rosin, turpentine, tar, pitch, and charcoal. It is king of the forest, and, with limited exceptions, on the alluvial land no other tree will grow. Its height is from one hundred to one hundred and fifty feet, and so thick is the growth and so dense the foliage that no grass, weeds, or shrubs will live, except the wire grass, which covers the ground everywhere, affording a rich and very nutritious pasturage when young, supporting immense herds of cattle, sheep, and other stock at little or no expense, and when it matures the straw makes good rugs, hats, and floor-cloths, and will make paper. The alluvial districts are confined to the rivers, creeks, lakes, and estuaries, and are incredibly rich from the great quantities of sediment brought down from the upper countries, and the rapid decomposition of the luxuriant vegetation which the humid and hot climate soon reduces to soil for further production. In addition to these causes, and the large extent of marsh lands, it necessarily becomes a malarious district, and persons living in it are subject to intermittent, bilious, and congestive fevers from the malaria always prevalent in the atmosphere during the summer and fall months. Owing to these predisposing causes, it is essentially necessary that all immigrants from our more northern latitudes, and immigrants from the plateaus of Europe, use every precaution against breathing this malarious air after sunset, and till an hour after sunrise in the morning, during which time its specific gravity causes it to settle near the earth; but the sun, rarefying the air, lifts it above breathing distance. Consequently situations on rivers elevated one hundred feet and upwards are more unhealthy than those on the low banks, unless they keep indoors later. These fevers evidently are caused by animalcular irritability, and are cured at once by using any remedy which is readily taken into the circulation, and destructive to the animals.

All persons, however, undergo what is vulgarly termed a "seasoning," or acclimating fever, which, with the young and middle aged, is generally light, of short duration, and by no means dangerous; but with children and old people, in the lower marsh districts, it is quite different. Most of them sink under its effects the second or third year. The seaports of Savannah, Brunswick, and Darien are equal to any on the Atlantic coast, the depth of water on the bars being from fourteen to eighteen feet, and capable of being deepened so as to admit the largest vessels. Darien and Brunswick are small cities; but the latter is now being improved rapidly in consequence of the energy and high appreciation of the importance of intercommunication with other communities, who can add to their wealth by coöperative action, which in her case is only obtained and secured by extended feeders, or arms of intercommunication, by which the large, populous, and wealthy communities of the Great West are made directly and reciprocally interested in changing their line of trade with the great outside world. This spirit, and the completion of a first-class railroad from thence to Macon, and another to Albany, and thence to Mobile and New Orleans, will place Brunswick in the front rank as a shipping point, and soon give her a population of twenty thousand or more.

Savannah is the principal seaport of Georgia, and is rapidly improving. It contains about twenty thousand inhabitants, which doubtless will be doubled in the next ten years, composed of a highly enterprising and far-seeing people, who possess in an eminent degree all the noble traits of character which constitute commercial greatness, and consequently prosperity. Owing to the exercise of these principles, Savannah is rapidly stripping the laurels from the brows of the commercial metropolis of the Carolinas, chiefly from the construction of far-reaching through-lines of railroads, which traverse the state from the seaboard, by *way of Macon* and Atlanta, to Nashville and the Great

West, and by way of Augusta and Columbia to Washington city and New York.

At Dalton, in North Georgia, a main through-line railroad from New Orleans to the national capital and New York traverses East Tennessee and Virginia for hundreds of miles, between the Blue Ridge and the Alleghany Mountains, through one of the most lovely, picturesque, and magnificent valleys in the world, called by European travellers the "Switzerland of America." Another through-line from New Orleans passes through Atlanta, Gainesville, and on through South Carolina, and north-eastward to Washington city and New York, which being the shortest and best grade, will be run through in less than fifty hours. It is called the Atlanta and Richmond Air-line Railroad, and is being built mostly by individual subscription. The state indorses their bonds for twelve thousand dollars per mile, and its completion is fixed at eighteen months.

Many other railroads are being built in different parts of the state, which in a few years will give every facility to the farmer, the manufacturer, and merchant in carrying on their business, and developing the inexhaustible resources of our common country.

Two first-class roads are under way from Cincinnati, Ohio, by way of Knoxville, Tennessee, and by Chattanooga to Georgia, and several to Alabama from Dalton, Chattanooga, Cartersville, and Atlanta, which, in addition to those between Atlanta and the coast, will give ample facilities for travel and transportation between Georgia and Alabama to the farmer, merchant, and miner.

The experiments of intelligent men of late years have proved that the culture of the peach, the olive, and the grape is capable of being highly remunerative in those vast sandy plains, which cover one third or more of the state, and are considered worthless after the pine forests shall have been removed. This discovery is of immense importance, and will enhance the value of our domain untold millions. Another source of wealth, now hardly thought of, and never estimated, is the extensive phosphate beds in the pliocene belt of the coast, which extend at intervals from the Savannah River to Florida, which are proved to exist by actual discovery at four different points. The same evidences of a subsidence of the land in Georgia exists that do in the Fish Basin of South Carolina. The discovered facts in Georgia prove the same fossils to exist, together with the same kind of vegetable proofs, as the trees *in situ*, showing that the same animal and vegetable life was in existence in both states at the same time; and, as "like causes produce like effects," there can be no reasonable doubt of the existence of the same manurial phosphates in the same *formation in* Georgia as that of the celebrated Fish

Basin of South Carolina, thus exempting us from dependence on our neighbors. Yet another source of wealth, which will in a few more years be made available, or brought into use, is that of the immense deposits of porcelain clay, which can be made to pay handsome profits by being worked, and thus supply a needed demand without relying on foreigners, who drain our country of money yearly for articles we can make ourselves, not only better, but cheaper, besides adding continually to our stock of the precious metals, and giving increased prosperity to our country. We also have unlimited resources in marls, equal to the employment of any number of manufacturers when a denser population shall demand their labor. Added to which no more profitable industrial pursuit can be offered than the culture of the sugar-cane, which grows luxuriantly, and produces equal to that of Louisiana and Florida. This staple product will increase as population increases, and its demands *must* be supplied.

The great truth of the wonderful effects of deep ploughing was exemplified the past year in Louisiana by the introduction of the steam plough, only five of which as yet have been brought into use in the United States, whilst 26 hundred are in use in England, Ireland, and Scotland. This one, in a sugar plantation, ploughed part only of a farm to the depth of thirty-two inches, and the balance of the farm was ploughed *with mules and* the common plough about nine inches deep. The result was, a little over fifteen hundred pounds of sugar per acre was made by the steam plough more than the other. As they cost six thousand dollars, small farmers cannot use them; but they can benefit by the facts, and plough less land, and plough it *deeper*, at least every three years; and by turning under a heavy coat of grass or weeds in summer, with a few bushels of lime per acre to decompose the vegetable matter, and combine with its elements to make plant food, the farmer can safely rely on a large annual increase in the productiveness of his land, and in a few years be able to adopt the best and most profitable system.

CHAPTER IV.

MIDDLE GEORGIA. — CIVIL AND GEOLOGICAL DIVISIONS. — REFERENCE TO THE MOUNTAINS. — ALTITUDE OF BLUE RIDGE. — "COTTON BELT" FOR UPLANDS. — COTTON FACTORIES IN AUGUSTA AND COLUMBUS. — TEMPERATURE OF WEATHER. — PEACH CULTURE. — PHOSPHATES OF LOWER GEORGIA TO SUPPLY HER FERTILIZERS. — "DORN MINE GOLD BELT."' — GALENA. — PRECIOUS STONES. — OLDEST FOSSILS ON EARTH. — AGALMATOLITE, RUTILE, &c.

THE second great civil division of Georgia embraces part of the tertiary district, and extends northward to the counties of Lincoln on the Savannah River, Clarke on the Oconee, and Harris on the Chattahoochee, adjoining Alabama, and has been long known as Middle Georgia, comprising the central part of the state, and the best part of the "cotton belt" for the growth of "uplands," in contradistinction to "sea-islands."

The altitude of Middle Georgia varies from three hundred and fifty to six hundred feet. More than half of its area has a clay subsoil, sufficiently intermixed with sand to make it one of the most productive regions in America, with a proper system of agriculture, in which a large majority are wofully deficient. The prevailing system is shallow culture, large areas to the force, and no rotation of crops, until the soil is exhausted, and then remove west and buy fresh land! By a course of rotation, subsoiling, turning under green crops, and the addition of lime and manure, — which is only available by having a meadow to support stock, — then the Middle Georgia farmer may laugh at reverses and live a prince.

The trend of the strata generally corresponds to that of the mountain range, sixty or eighty miles off. As before observed, the great central axis extends from the stone mountain in De Kalb County for a thousand miles to Nova Scotia; but there are at least four lateral, nearly parallel axes in a distance of five hundred miles, which diversifies the soil and affords a wide range for the outcropping of metalliferous veins, which are very numerous and generally remunerative. The width of this disrupted belt is about one hundred and fifty miles. The rivers and smaller streams (except the Chattahoochee) on the eastern slope run at nearly right angles to the strata and mountain chain, producing innumerable falls and rapids, suitable for manufacturing purposes. The altitude of the mountains varies from three thousand to four thousand feet, and one peak — the Tray Mountain, at Nacoochee — is five thousand feet. Farther *north-east, in Buncombe* County, N. C., the Black

Mountains tower up to the height of nearly seven thousand feet, being the highest land east of the Rocky Mountains. In Georgia the mountains are from two hundred and fifty to three hundred miles from the Atlantic, and about seventy-five miles from Middle Georgia, and consequently the middle belt comes in for a comparatively small share of water power, though amply sufficient for a population of at least two millions more than she now has. Augusta, on the Savannah River, and Columbus, on the Chattahoochee, adjoining Alabama, are the most favored points in this section, both being situated immediately below the primary formation, the termination of which, and its connection with the cretaceous and tertiary, produce that chain of falls so conspicuous from Alabama to the Potomac, plainly marking the ancient shore-line of the ocean during the deposition of the permian group of the Carolinas and Virginia, enclosing the narrow coal-fields of Deep River and the James above Richmond.

The falls at Columbus and Augusta have been improved by some of the finest flouring mills and cotton factories in the South. One extensive cotton factory of fifteen thousand spindles and six hundred looms, in Augusta, is represented by Senator Sprague, of Rhode Island, as being the most perfect, profitable, and best conducted factory in America, which is the highest *encomium*, as he is by far the most extensive manufacturer of cotton fabrics on the continent. It pays over twenty per cent., and all manufactories in the South, where properly conducted, pay a much better interest than in the North, in consequence of the mildness of the climate, and the greater cheapness of living, together with saving in freight and fuel, all conspiring to give a decided advantage to the southern manufacturer.

Augusta contains eighteen thousand eight hundred inhabitants, eight thousand of whom are negroes. This city is conceded by all travellers to be one of the most beautiful in the United States. Her streets are very spacious — from seventy-five to one hundred and fifty feet wide, and planted with four rows of trees, except Broad Street. This gives the impress of comfort and pleasure, to which is added a bountiful supply of water from the canal, sweeping away the filth and dirt into the river, cooling the air in summer, and giving health and pleasure to her industrious and intelligent citizens, who are pious, honorable, and enterprising, with a hospitality unsurpassed by any people in the world. Augusta must soon become a great railroad centre, which will attract capital to convert her surplus water power into active means.

The yellow fever once raged in this city to an alarming extent, caused by reckless disregard of every sanitary regulation. It was thus in Philadelphia in *Dr. Franklin's* day; but in the future it is hardly probable that the yellow fever will ever again visit either place. At least there is no necessity for it, and if it do happen, it will be attributable to culpable neglect on the part of the official citizens.

The great flood in the James River last fall ought to influence the city council of Augusta to prepare for a similar catastrophe (for it will certainly come) by building a levee, which would not cost the fourth part of the destruction incident to an overflow of the city, independent of the loss of life, which it is the bounden duty of the city fathers and public officers to carefully guard and protect. The city is built on *alluvial land*, and the same laws which operated to form her present banks or plateau will again operate to elevate it still higher. Thus it is in Italy and other countries. Their embankments are raised every quarter or half century to compensate for the filling up the river bed with the gradual and unnoticed debris from the industries of thousands of people. The relics of antiquity above this city, at Stalling's Island, will claim our attention in another chapter, as constituting one of the most interesting links in the great chain of events which have been partially developed since the discovery of America. Numerous relics of antiquity, of inestimable value, have been lost for want of a proper medium of action through the government, and a suitable repository to preserve them for future use.

Columbus, on the opposite side of the state, on the

Chattahoochee River, is yet but a small city, situated at the head of steamboat navigation, and considered to be quite healthy. She is destined to become a considerable cotton mart, as well as manufacturing centre. She now boasts of one of the largest cotton factories in the South, running twenty thousand spindles and four hundred and eighty-five looms. She has many other factories, and a surplus water power equivalent to half a million spindles, with all their accompaniments. It is a beautiful city, peopled by a high-toned, intelligent, and energetic people, who have ambition and determination of purpose to carry out any laudable pursuit, and deserve help in capital to develop their purposes. She must also have other railroad facilities, but her destiny lies in her magnificent water power, which is equal to the safe investment of millions in manufactures.

It is here the peach reaches its greatest perfection, and exceeds that of all other countries on the globe in its unequalled flavor and lusciousness. The climate is mild, seldom indicating twenty degrees in winter, but its general temperature ranges between thirty-six degrees and sixty degrees. In summer the thermometer frequently rises to ninety degrees, and sometimes to ninety-five degrees, but only for a few days. Ice is seldom formed, and snow sometimes does not fall for several winters; at other times it will fall several inches deep, but soon disappears. The chief plantation crop is cotton, though many farmers raise corn and wheat sufficient for home consumption. That of wheat is of very superior quality, surpassing in weight the wheat of all other countries, weighing from sixty-eight to seventy pounds per bushel, and, with ordinary culture, produces from ten to fifteen bushels per acre; by the use of guano and bone dust sometimes forty bushels are realized. Even larger crops could be made by the addition of green crops and deep ploughing. The important fact has lately been discovered that the wheat of Middle Georgia, and similar climates in the Carolinas and Alabama, contains from sixteen to twenty pounds less of moisture than northern wheat, and consequently will make a flour requiring that much extra water to be added in making bread, which the baker has to pay for when he buys flour from northern wheat. This fact was discovered by repeated losses in shipping flour for many years from both sections to the West Indies and South America, all manufactured from wheat grown in the North or West soured, more or less; but the flour from Georgia wheat kept sweet and good, from its freedom from moisture.

These facts and subsequent investigations have satisfied all dealers, and given a higher value to southern wheat, and led to the issuing of a patent to General Lee, of Philadelphia, for depriving flour of northern wheat *of its moisture*, by passing it into a long cylinder, thirty feet by three feet diameter, of iron, heated to the proper degree by a furnace, through which the flour passes slowly, from end to end, as it revolves, and finally is emptied into the packing-room deprived of its moisture, thus fitting any wheat for a tropical market.

Most of our lands are deficient in phosphate of lime, and it should be supplied with it in the form of guano, or bone dust, or the carbonate of lime, put upon greensward in August, which before spring will chemically combine with atmospheric and earthy mineral elements, and answer the same purpose, though in a less degree. Two hundred pounds of any kind of phosphates of lime per acre will, with properly prepared ground, yield from double to three times the crop of unmanured land. All wheat crops, if properly *fed*, will be equal; the number of grains in each head will always be the same, and, if *full fed* with proper food for both the stock and grain, then the crop will reach eighty bushels per acre; but the farmer must learn the important fact that it requires a *different kind of manure or food* for the stock and the fruit, and he must learn what kind of manure is *best adapted to his lands* before he invests money and labor fruitlessly. I have known many farmers in South-west Georgia purchase Nova Scotia plaster (sulphate of lime) and apply it to their lands when they already contained too much, and they not only lost their *money, but their* labor. Some lands are deficient in potassa, and will not bring a remunerative crop of Irish potatoes. Some lack ammonia, and some nitrogen. All must be supplied, or the farmer suffers a loss of labor and money. In Muscogee County oats and rye yield full crops, and barley, though but little cultivated, is not surpassed anywhere. Even clover succeeds well on all clay lands, if sown with timothy or herds-grass, upon land well turned under and subsoiled in August or September with wheat or oats, the ground well pulverized and rolled. The wheat or oats will protect the clover till harvest; and, when the grain crop is cut off, the meadow grass will protect it till fall from the hot sun, and the next year the clover will have pushed its roots deep into the prepared ground, and asks no protection, yielding from three to four tons of rich, good hay per acre. The third year it may be turned under, with a slight dressing of lime to decompose it and form plant food for the coming crop, which will be nearly doubled, without any other manure whatever; but with an addition of one hundred or two hundred pounds of superphosphates or guano, the crop will be more than doubled, and in the mean time add largely to increase the fertility of the lands by its chemical combinations, and, as a nutritious provender, doubles the farmer's stock yearly, which, independent of the profits from beef, butter, cheese, milk, mutton, and wool, will certainly increase the production of the grounds until they attain their fullest capacity, instead of exhausting them as heretofore. It is an established maxim with farmers of England, and parts of our own country, that it is impossible to keep up and improve a farm *without stock;* and it is quite impossible to keep up stock *without a meadow;* hence the great, and, we may say, paramount importance of adding largely, each year, to the area of pasture and meadow lands, so as to produce the necessary plant food. The vast manurial beds, in the lower districts, of the phosphates of lime and marls, similar to those in the celebrated "Fish Basin" of Charleston Neck, when fully developed and explored, will enable the farmers of Georgia to recuperate their worn-out and exhausted lands at a trifling expense compared with the present system, as they can get them at less than half their present cost.

Look at Pennsylvania forty years ago, when she was, like Georgia, a *terra incognita* as to her mineral resources. Look at her to-day, with the advantages and results of a geological survey, and you see her iron and coal fields developed, and teeming with life and the busy hum of machinery, her canals and railroads groaning under the loads of mineral wealth, long hidden from sight, and her prosperous and happy people rejoicing in their prosperity; whilst Georgia, with *more and richer iron mines*, with coal enough to supply the wants of five millions of people for two thousand years, exclusive of her inexhaustible gold, silver, and copper *mines, her diversified* other valuable metals and minerals useful in the arts, which Pennsylvania *has not;* and last, but by no means least, the Empire State has a *diamond district* equal in extent to that of Brazil, and capable of supplying the wants of fashion and caprice for countless ages. Yet with all these facts paraded before them year by year for half a century, the legislature refuses to appropriate the contemptible sum necessary to make these magnificent additions to her wealth. All other civilized states and nations have surveyed their territories, not only as a matter of direct interest to their citizens, but for the advancement of science. In Europe, and the Northern and Western States, if any one wish to ascertain the geology, mineralogy, or topography of Georgia, he looks in vain through the national and state libraries for the coveted information. He is informed there has been no survey of the state; and Georgia is a *blank in science!* The seeker after knowledge wonders why this seeming anomaly should be. Is it the love of the *almighty dollar?* No. *It is political dishonesty and partisan prejudice.* This disgusting and damning principle has cost Georgia more than *five hundred millions of dollars*, kept her poor and dependent for half a century, and now leaves her thirty years behind the age in the progress or race of nations after fame and knowledge.

It is a source of much regret to all lovers of science, of progress, and the advance of the arts in Georgia, that the legislature refused to make an appropriation for a geological survey of the state, in consequence of partisan differences of opinion, and wrangling about abstract principles which are beyond their reach.

Half a century has passed, and the proud old state looks at her sisters, some of whom are yet in their leading-strings, and blushes to find them all far ahead of her in the march of science, and her name a blank on the page of progress! An appropriation of the small sum of fifty thousand dollars would enhance the value of her real estate at least five hundred millions of dollars, and infuse a spirit of emulation and ambition equivalent to as much more. This is no day-dream. It is the result of the immutable laws of God. Every year we see the rapid march of power and wealth, population, and progress in the arts in the Great West, and on the Pacific coast; large cities are built in a year, or ten years, and they attract population, which makes wealth by creating new values. Chicago, Cincinnati, Omaha, Milwaukee, and a hundred places have thus become great commercial and manufacturing centres as if by magic. Atlanta is another glaring instance, which should teach many of our snail-gait citizens a useful lesson — that great ends are never attained by penurious means; consequently men of enlarged ideas should be elected to first govern a city in its incipiency; otherwise it will sink into that insignificance *which corresponds* with their own littleness.

CHAPTER V.

DORN MINE GOLD BELT. — DIFFERENT PROCESSES OF WORKING GOLD ORES. — THE ARASTRA. — THE STAMPING MILL. — SYSTEM OF AMALGAMATION. — SMELTING FURNACES. — RUSSIAN PROCESS. — FERTILIZERS. — DIXON COMPOUND.

TRAVERSING the state from Harris County on the Chattahoochee to Columbia on the Savannah River, is a narrow gold-field, which, as yet, has been but superficially explored, only a few mines having been worked. The Broomhead Mine, formerly known as the Columbia Mine, in Columbia County, was worked for twenty years, before the war, to the depth of one hundred and fifty feet, yielding large profits; but during the war the machinery was destroyed, and the mine suffered to fill up with water, which remains in that condition for want of capital and the proper kind of labor. Several others are in the same condition, all of which are capable of being made to yield good profits. The veins vary from two to five feet in thickness, and dip from sixty-five degrees to eighty degrees, with a strike of forty degrees north by east and south by west. The matrix of all the veins is the same —

a compact, whitish quartz, containing from five to ten per cent. of sulphuret of iron, in which most of the gold is imbedded in the state of an impalpable powder; but some of it is found massive and integrated in the solid quartz. This gold has but little alloy, assaying from nine hundred and twenty to nine hundred and fifty.

Considerable loss is occasioned by a want of system and proper machinery. It is generally all worked together, whereas the different kinds should be assorted and worked separately, by different processes, the quartz ore crushed and amalgamated by itself, and the sulphuretted ores roasted in a furnace so as to expel the sulphur, and then subjected to amalgamation or smelting, — the latter process being much the best, provided the ore contain enough lead to serve as a flux; otherwise litharge must be added, and the heat adjusted carefully so as not to waste the gold by sublimation. The smelting process has not yet been adopted on a working scale, though no doubt exists as to the great difference in the yield from the two processes; but the cost of furnaces and the material used as a flux prevents most people from adopting it.

The usual method of working gold ores, in Georgia, is by amalgamation, after the ore has been reduced to powder by a stamping mill, or crusher — the mill *by all means the best*. The stamps are made of cast iron, seven or eight inches square, and about eight inches deep, with a socket to receive the wooden shaft of post oak or hickory, sixteen feet long, which, with the *chilled stamphead*, should weigh from five hundred to six hundred pounds; even eight hundred would be more profitable. This, by the aid of a cam, is raised eighteen to twenty inches, from three to four times each revolution of the wheel, reducing the hard quartz ore, containing the gold, to powder, which, by the help of the water flowing into the stamping bed, is forced through fine screens of copper or iron, upon an inclined platform covered with sheet copper coated with quicksilver, from whence it passes into reservoirs of quicksilver, into which the water pours, and forces the sand from these on to inclined planes, sixteen feet long and eighteen inches wide, covered with woollen baize cloth, which arrests another portion of gold and much of the sulphurets. These cloths are washed off every hour into a tub, to be ground over by an arastra. The sands, and such gold as still refuses to be caught, pass into long, slightly-inclined reservoirs, where the sediment is collected and removed once a day, and ground and rewashed; yet, after all, there remains a considerable amount of gold, which, for want of proper means, is lost to the operator, amounting to about one fourth, and another fourth is *chemically combined with the sulphurets*, which renders it im*possible for any* system of amalgamation, or any mechanical means, to save, except by solution in nitro-muriatic acid, or *by smelting* in a suitable furnace. By either process more than twice as much, and some kinds of ore yield more than three times as much as by the best process of amalgamation. But one objection opposes its introduction, and that is now, to most parties, insuperable: it costs too much, and requires more skill and practical knowledge than most miners can command. Some years ago, the author, after making numerous experiments in Georgia, shipped a quantity of the sulphuretted ores, from different veins, to New York, and continued the experiments in various ways, and by the use of different fluxes, and fully satisfied himself that nearly half the gold was lost by the ordinary processes. He then corresponded with the Emperor of Russia relative to his process of smelting the gold ores of the Ural Mountains, who kindly furnished every information through the mining superintendent and his minister plenipotentiary at Washington, which confirmed former experiments, and satisfactorily proved that all the auriferous sulphurets of iron, copper, and lead, in Georgia, contain, as before shown, at least twice as much gold as we obtain. Colonel Stevens, of New York, learning these facts, took out a patent, in 1866, for what he termed the "Stevens flux," under which flimsy subterfuge he made money. It consisted of *fluoride of calcium*, which, he pretended, was a new discovery, and thus gulled many of the credulous, by exhibiting large yields from ores considered poor by other processes. Expending large sums of money in experiments, and constructing furnaces in Georgia, the whole fell to the ground, and the colonel and his coadjutors lost their expected fortune.

The success of Colonel Anisoff, superintendent of the Russian mines, proves that smelting gold ores *can be effected* profitably on a large scale, and also that such ores do contain a much larger percentage than the miner in the United States now obtains. The old dogma that gold does not exist except in the *metallic state* is false.

Some few of our mills use the galvanized copper plates; some use the mercury under the stamps, and take out the amalgam once a day; but this is a very wasteful process, in consequence of the loss of mercury by continued attrition, by dividing the quicksilver into fine, partially oxidized globules, which float off and carry the fine gold with it, and defy all means to arrest or save it in that state.

A mill of good construction will reduce from two to three tons of ordinary ore per day to each stamp, which, as before stated, should weigh from five hundred to eight hundred pounds. The stamphead should be cast in *two pieces*, the one for the reception of the shaft, and the other of *chilled Franklinite*, fixed so as to be readily replaced when it wears out, which will last four times as long as common cast iron. The former contains sixteen per cent. of zinc and seventeen of manganese, which causes it to wear away slowly in *streak powder*, whereas the iron stamp *crumbles away in visible grains*, frequently as large as flax seed, owing to the different form of crystallization of the two combinations. Twelve stamps are equivalent to the reduction of the ore from the labor of two miners and eight hands, a team-driver and two millers, and one captain or superintendent, — all at an expense of twenty dollars to twenty-five dollars per day, averaging twenty tons on a first-class vein, and about ten tons on ordinary ones. The gold ores of Georgia, on an average, have a lower range than in North Carolina, both in productiveness and facility of reduction. They vary from three dollars to twenty dollars, with occasional small veins of forty dollars, sixty dollars, and even one hundred dollars per ton. The cost of a twelve stamp mill, with water power, is about one hundred dollars per stamp, but much higher with steam. The most of the mines are within easy range of water power.

In a few years, when our iron mines are improved, and forges, furnaces, and steam engines, tools and all mining machinery, are manufactured *here*, then the miner can build a mill at least fifty per cent. cheaper, and thousands will engage in the business who are now *deterred from it* by the high prices of machinery, and the delays and cost of transportation. We have some mills made in Rhode Island, some in New York and Philadelphia, and some few in Georgia, of the first class; from twenty-four to forty-eight stamps, with all the appurtenances, costing from twelve thousand dollars to forty thousand dollars: yet the best and most expensive mills and outfits have in all cases proved failures, in consequence of want of practical knowledge of the business. Many of the superintendents of mines were men of unquestioned talents and integrity, but totally ignorant of the business in which they engaged. They possessed every qualification except *practical knowledge*, which is indispensable to success; and when a superintendent possesses these requisites, we will guarantee a brilliant success on any of the gold veins in this region. The ores in Hall County are not so rich as in Lumpkin and White, but more uniform in their yield, and thus secure certain dividends, which is not the case in some sections: it is a fortune or *nothing*. All the veins in Hall County, now known, are what are improperly called "segregated veins," except two, which are so little known that only their general character is determined. The best and most expensive mill in the state is in Lumpkin County, near Dahlonega, owned by Colonel Pride, of the United States army: so far it has been a total failure, for a want of a knowledge of the business. *The ores are* worked after the Mexican plan, and that of Gold Hill, North Carolina. Of improved arastras, by which the ores from the crushers or stamps are passed under the action of the arastras, which revolve twelve times per minute, weighing about two tons, they reduce the ore to powder, and in the beds containing several hundred pounds of mercury, the gold is amalgamated. The attrition caused by the rotary motion of the stones or cast iron wheels, moving in a circle of six feet radius, causes an additional *sliding motion* or *friction*, which removes the coating of oxide of iron so common with sulphuretted ores, and causing it to be lost by ordinary processes. This increased yield causes many to adopt this process. In a first-class mine in North Carolina, they work from sixteen to forty-eight of these machines, which are necessary to work off the prepared ores from fifty to one hundred hands, and yielding from eighty thousand dollars to one hundred thousand dollars per annum. These mines are in Rowan County, and have been worked seven hundred and fifty feet deep, requiring heavy and costly pumps and machinery to drain them. The old Cornish pump still holds precedence, as being most effective and least liable to get out of order. But few mines in Georgia have been worked deeper than the water level. The cost of a nine-inch Cornish pump with one hundred feet of pipe is one thousand dollars; and an engine necessary to work the ore from the labor of fifty hands, and raise the water to drain the mine, will range from five thousand dollars to six thousand dollars. Most of the mines are, and have been, worked without either science or capital! An adventurer finds a vein, puts up a mill on one of the thousand water powers at hand, and buys three or four stamps of one hundred pounds each, at a cost, including the gudgeons of his wheel, of about forty dollars, and does the wood-work roughly himself, or hires a rough carpenter, builds his mill, digs his own ore, and has it rolled to the mill by some member of his family, and fed under the stamps by some one else, and saves the gold in a common riffler with quicksilver in it,—losing more than half of it. Another uses inclined planes and baize cloths, and by a more extended operation makes more; but with this crude, simple, and cheap plan of working, millions have been made annually.

By an economical and scientific system of mining in North Georgia, the ores will yield more than a hundred per cent. for ages; and the silver mines, from the assay of the ores, will yield much larger profits. There are but four sections in a width of two hundred miles where silver ores have been found. The first has shown but meagre outcroppings, and of a low grade. It traverses Taliaferro, Wilkes, Columbia, and Lincoln Counties. The second passes through Gwinnett, Hall, Banks, and Habersham, and shows rich outcroppings at various points, is opened in Hall, and assays from twenty dollars to sixty dollars per ton. The third runs through Pickens, Union, Towns, and Rabun Counties. The fourth runs through Murray, Fannin, and into Cherokee County, N. C., which is opened in one place near Murphy, and is very rich. The ore of all is argentiferous galena, and is highly auriferous, the lead being equal to the demands for a flux, with the lime on the ground in three of the leads. Soapstone is found to accompany two of these leads, and the flexible sandstone, for furnace building, runs through the whole length of the second lead.

Nearly all the gold mines in Georgia were filled up during the war, and remain in that condition. Some few have been reopened, and put in working order, and yield fine profits. Others will soon commence operations on a large scale.

One noticeable fact, in regard to the taconic formation in the Carolinas and Georgia, is of interest from being new in science. From the Hoosac Mountain, in Massachusetts and Connecticut, this formation develops itself southwards to Georgia, both on the eastern and western slope of the Appalachian range. Its distinctive characteristics are strongly marked in Fannin, Murray, and Floyd Counties, in Georgia, and all Western North Carolina. The fossil remains, recently found in this formation, are of the *greatest importance*. In a peculiar quartzite rock thirty miles long, and from five hundred to one thousand feet thick, alternating with talcose slate, auriferous quartz, and argillaceous slates from two to six miles thick, are found these univalve coralline shells, from one fourth to one inch in diameter, silicious, and in immense numbers. This formation is at least five thousand feet lower in this group than any fossil animal organism yet found, either on this continent or in Europe. The quartzite resembles gun-flint, and is semi-metamorphic, and so near the plutonic rock that nothing intervenes except the highly crystallized rocks, proving it to be the lowest fossiliferous rock yet found, and the first animal God put upon the earth after the creation.

This peculiar formation is situated within four miles of the ancient shore-line of the ocean, where the narrow permian belt of rocks was deposited, and the coal seams, to make the Deep River coal-fields, and those above Richmond, Va. On the north side of this coal-field is a stratum several hundred feet thick, of agalmatolite, or *Chinese figure-stone*, some parts of which are very pure, and now being ground into flour, and shipped to New York and other places, to be used as an adulterater of flour, candy, paint, &c. It is highly inclined (eighty degrees), upon which rests the new red sandstone of the coal-measures. Of the figure-stone the Chinese make their gods for family worship; *but the more* intelligent Yankee turns it to better account. Seven thousand barrels of this flour are ground and shipped north annually, and as much more, *in bulk*, of the finer grades used for crayons, cosmetics, &c. This quality brings in market from twenty to twenty-five cents per pound, when sawed and put up in boxes, the cosmetics fifty cents, and the mass of it only two cents, or forty dollars per ton. Yet this pays very well, from the cheapness and facility of procuring it. Much of the medium qualities is used for stove-linings, lamps, and furnaces, and the pure talc, or pyrophyllite, for lubricating purposes. The corresponding formation west of the mountains is found in Buncombe, Macon, Clay, and Cherokee in great abundance, and in Fannin and Murray Counties in Georgia, it appears in great beds of superior quality, called by the vulgar "soapstone." The essential difference between the "agalmatolite" and the Georgia "pyrophyllite" consists in the former being composed of silica sixty-three and *alumina* thirty; whereas that of the pyrophyllite is silica sixty and *magnesia* thirty-three. This chemical composition renders it valuable as a lubricator for heavy machinery, and wagons, carriages, &c.

Middle Georgia is celebrated for its delicious strawberries, peaches, grapes, and other fine fruits. Her peaches are unequalled in flavor and production. *No part of the* world can compare with this section *for fine peaches* and strawberries, the culture of which heretofore was solely for home luxury and consumption; but since the war, and the opening of numerous lines of railroads and steamships, together with the emancipation of their slaves, the farmers are extending the peach, apple, and grape culture beyond conception. First-class peaches, put up in boxes or baskets, packed in cotton, and shipped in June—nearly two months before the New Jersey and northern crop is ripe, or fit for market—readily command from twenty to thirty dollars per box of one and a half bushels. When the northern crop comes in, the Georgia farmer "cans" his remaining late fruit, and ships it north, or to Europe, where it commands a very fair price. The business is yet in its infancy, but must soon assume vast proportions. Apples do not come to perfection in Middle Georgia, though several summer varieties succeed well; but winter fruit ripens too soon, and rots. North Georgia is the great apple region, destined to supply the midland and coast-line with choice fruit, as soon as railroads shall have been completed for its cheap transportation, and an enlightened system of agriculture adopted, which as yet is of slow growth, in consequence of strong prejudices entertained by the primitive settlers against what they term "book-learning."

Hancock County claims to be the pioneer in these improvements, and justly so, by reason of inaugurating *a regular* system of farming, through her Agricultural Society, which was organized some twelve years ago by a small body of enlightened farmers, who had the means and the will to carry it out to their entire satisfaction. From this nucleus, or focus of practical and experimental farming, immense benefits have resulted, which will require years yet to be appreciated. More than seventy counties have profited by their changed system, and have organized societies; and in a very few years, through the exertions of Colonel Lewis, the secretary of our state society, and David Dixon and others, we have no doubt these new improvements will be adopted in every county in the state. The great drawback on the rapid advancement of this change is the general ignorance of the farmers of the science of chemistry, by which they frequently apply the wrong fertilizer to their lands. It is a not uncommon thing for the farmer, in the marl lands of Southwest Georgia, Alabama, and Mississippi, to purchase gypsum, and apply it, because of its good effects on the wheat crops in large sections of Virginia, where there is a deficiency of lime. He loses his money and his labor for a want of knowledge of this fact. Hence the great necessity of a central chemical laboratory, supported by the state, where every farmer may go, or send specimens of his soil, subsoil, rocks, and ores, and have them analyzed, so that he may know what kind of fertilizers *to buy*, and, what is of more importance, *what kind to make*. Each farmer should make his own manures, after his meadows are formed, and his stock equal to the production of the *basis*, for the bulk of all manures is in *some form of vegetable matter*, which exists in the alluvial lands, or by turning under greensward of any kind. Look at the immense increase in the grain crops of England and France, and other parts of Europe. All has been brought about by the fostering care and aid of the government. They consider it a *reciprocal* duty. The people, from necessity, are forced to adopt it or starve. Here we are not thus situated. We can exhaust our lands, and *move to fresher ones.*

We have an abiding hope that the next legislature will make an appropriation for this object, and establish a laboratory, with a department of mineralogy, and give the needed facilities to a rising and ambitious agricultural community, who will return the outlay in taxes tenfold, and place us in the proud position we so much deserve. Atlanta now boasts justly of one of the most distinguished young chemists in all the South, who is importuned to remove to Philadelphia. Will our legislature permit this, and add to the already increased power of these northern cities to keep us in bondage? We hope not. Keep all the talent and skilled labor in the country by granting inducements; and in a few years we can boast of several manufacturing *centres* equal to any in the world.

The midland and lower counties form the centre of the wine district, particularly for the celebrated Scuppernong, which is destined not only to supply this continent, but compete successfully with Europe in the trade. Then alcoholic drinks will be discountenanced, and the Americans become a temperate and sober people. Greensboro' and Madison, on the Georgia Railroad, are beautiful, unpretending cities, whose inhabitants possess intelligence and a high grade of moral character, but lack only one thing to become great, and that is, ambition. No people on earth have a superior country or climate, and one susceptible of the highest possible cultivation, provided they change their system of culture to one of rotation and diversity of crops, so as to improve their lands without resorting to expensive fertilizers. Such communities as these, and Albany, Americus, Lexington, and other centres of intelligence, should originate, and show their less favored neighbors what constitutes their best interests. Lexington has some rich gold veins in her neighborhood; but no one has the will or means to work them.

Throughout this section are inexhaustible beds of kaolin, iron, burhstone, the amethyst, opal, agate, jasper, and various other valuable minerals and precious stones. The resources of Middle Georgia are immense, and will require ages to even so far develop them as to make an approximate estimate of its agricultural and mineral wealth. The time is at hand when she will manufacture all of her cotton, flax, wool, and hemp, ramie, &c., instead of sending them to the North and to England to be manufactured, and returned to drain our country of the first cost of the raw material, and take hundreds of millions from the pockets of our people, who have equal intelligence and superior facilities for making a better and cheaper article. Our present system gives nearly all the profits to our neighbors. It is for this we want the right kind of population and intelligence, capable of securing independence. This is now taking a favorable direction, and will soon establish the facts necessary to convince any capitalist of the striking difference in favor of southern cotton and woollen manufactures over northern.

The city of Macon takes the lead, as she did in female education, and now numbers thirty-seven thousand spindles, with another factory nearly completed of twenty-five thousand more, with the necessary looms to work it up into cloth, which commands a higher price in any market of the same grade than northern, in consequence of the superior cotton. These are suggestive facts, and should encourage further investments.

CHAPTER VI.

NORTH GEORGIA. — POPULATION. — RAILROADS. — GEOLOGICAL AND GEOGRAPHICAL DIVISIONS. — NORTH-EAST GEORGIA. — TEMPERATURE. — ALTITUDE OF THE BENCH LANDS AND VALLEYS. — RAINFALL. — STATE ROAD. — COST OF RAILROADS, &c.

WE now enter upon a description of one of the richest mineral and agricultural districts in the state, containing a population of half a million, about one fourth of whom are negroes, who were formerly slaves brought from Africa by the English, Dutch, and New England traders, and sold to the southern planters. The most of them live in cities, towns, and railroad stations, preferring that life to the more secluded one of a farmer. They were emancipated during the revolution in 1864, and, as far as their limited mental capacity allows, conduct themselves very well. They have been elevated, by contact with the white race, in the scale of being, to their highest capacity, and occupy a position far above their normal condition. Circumstances over which they had no control *have placed them* suddenly in a false position, and consequently they are, as a race, rapidly becoming extinct. With all the humane appliances of civilization, by the help of missionaries, thousands of school-teachers, the equality of the right of suffrage, and civil office, they are decreasing in numbers daily, from the fact that they, like the Indians, readily adopt all of our vices, and but few of our virtues.

This part of the state contains forty counties; and much the largest part of the population is engaged in agriculture, some in manufactures, and another portion in mining. Both the latter branches are yet in their infancy, for want of capital and skilled labor. In fact the same may, with equal propriety, be said of agriculture. For reasons before stated, a large majority refuse to adopt the modern system of farming, which is predicated on scientific principles, and continually increases the production, while the old mode as certainly exhausts the land, and, in thousands of instances, reduced them so low that occupants were compelled to abandon them, and seek homes in distant lands to prevent starvation. These same lands are now being renovated by proper culture, and yield larger crops than in their virgin state. Some waste lands of this class in Newton, Monroe, and Fulton counties produced last year from sixteen to thirty bushels of wheat, and other crops in proportion; by deep ploughing and rotation of crops.

North Georgia is traversed by the Western and

Atlantic Railroad, or, as it is usually known, the State Road, which connects at Atlanta with the Georgia Railroad, the Macon, Central, and Savannah Roads, the Montgomery and West Point, and the Atlanta and Richmond Air Line Road, which runs from Atlanta to Gainesville, Charlotte, N. C., Richmond, Va., and north. The State Road is one hundred and thirty-eight miles long, being a grand trunk, with its western terminus at Chattanooga, on the Tennessee River, where it connects with the Charleston and Memphis, the Nashville, the Wills Valley, and Alabama, and the Chattanooga and Cleveland Roads. The State Road also connects with the Selma and Dalton Road, the East Tennessee and Virginia, the Cartersville and Van Wert Roads, now in running order, and many others in progress or projected. This grand trunk road is owned by the state, and pays from seventy thousand to one hundred thousand dollars per month gross earnings. For many years it paid forty thousand dollars net per month, and recently only twenty-five thousand dollars, and for the last year a very trifling sum, which caused the legislature to lease it out to a very responsible and energetic company for twenty-five thousand dollars per month for a term of twenty years. Thus it is with all public works and improvements by the government; they soon become levers of corruption and power in the hands of unprincipled officers and party politicians, and the people ultimately *are the slaves of the officers of their own creation!*

On page 225 will be found a table of the thirty railroads chartered by the last legislature, with state aid, from twelve thousand dollars to fifteen thousand dollars per mile. Some of these traverse rich districts, opening communication between the seaboard and the Great West, several hundreds of miles in length. By these additional commercial avenues to these connecting points, which, with those now in operation, will supply the deficiency, and demand now so much felt, both in transportation and travel, the State Road, from the topographical and geological nature and configuration of the country, must ever continue to be a main trunk line; but to engross and occupy that position, its *short curves must be removed*, so as to increase the speed without endangering life, which cannot be done in its present state. The engineer, who surveyed and located it, certainly had but little regard for either, or for his own reputation. All the other roads are owned by private stock companies, and pay from ten to twenty per cent. on the investment.

The Atlanta and Richmond Air Line Road is now being built, and will be completed in 1872, forming an unbroken air line from Boston to New Orleans, which is intended to be run from New York to New Orleans in fifty hours; but, if rightly engineered, with *fewer unnecessary curves*, it could be accomplished in thirty.

or, at farthest, forty hours. This great through line traverses one of the richest mineral regions in the United States for six hundred miles, which, for want of railroad facilities, has measurably lain dormant for ages. But as soon as this road is opened, and others finished from the coast to the Great West, there will necessarily be an immense influx of capital and labor. This through line gives the community the choice of a third route from those great commercial centres. The Cincinnati and Charleston Railroad is also nearly completed. This main line crosses the Alleghany Mountains; the Iron Mountains, and the Appalachians, passing through North-east Georgia into South Carolina, and thence to the ocean at Charleston. Like the great Atlanta and Richmond Air Line it traverses the coal region of the West, and crosses those interminable iron and copper fields in Tennessee and Georgia, and thence into the gold region, and lastly crosses the diamond belt. Both roads will develop untold wealth, and densely people a large district which is now almost a wilderness. A branch from Rabun Gap is now being surveyed and located to connect with Athens and Union Point. Yet another branch is being built from Old Pendleton, S. C., to Augusta, through Elbert, Hart, Madison, Lincoln, Columbia, and Richmond, to Augusta, where it connects with the Port Royal Road, and also the Savannah Roads. One of the most important of all those recently chartered is the road from Brunswick to Knoxville, Tenn., which may be properly termed a branch of the great Cincinnati and Charleston, as it intersects it at the gorge, or passage of the Tennessee River through the Iron Mountains between thirty-five and forty miles south of Knoxville.

These, with several others, either finished, in course of construction, or projected, will afford every facility for travel and transportation required by the most favored people.

Owing to the formation of the country, railroads cost much less in the South than in the North or in Europe, in many cases not ranging higher than fifteen thousand dollars to twenty thousand dollars per mile, and never exceeding forty thousand dollars, unless in crossings or tunnels. In Europe the cost is from fifty thousand to seventy-five thousand dollars, and very often much higher. This is by no means to be condemned as extravagant, but done purely in a spirit of economy and gain. From one depot to another, or one city to another, the road is made as straight as practicable, without regard to the prime cost, as they can, on a straight line, run safely forty miles per hour, and but twenty on a road whose curves are on a radius of one mile; therefore they gain not only in time, but in absolute safety.

This was exemplified in a remarkable manner by the Emperor of Russia when he decided to build a road from St. Petersburg to Moscow, a distance of nearly five hundred miles. He summoned his engineer corps before him, and delivered his orders for the survey of a direct route between the two places. They entered immediately on their duties, and made several preliminary surveys to no purpose. It was impossible to build it on a direct line, for it crossed two lakes, around which they diverged, and brought the report and laid it before his majesty. They were abruptly dismissed from his presence, and from his service, in disgrace. He then summoned another before him, and gave the same positive directions. But he, knowing the nature and peculiarly despotic character of the emperor, determined to obey him to the letter. He formed his corps, and made the survey through the lakes, and completed the line, and made his report with the enormous cost of trestle-work and subsequent filling up the embankment, and doubtfully presented it; but had the proud satisfaction of meeting the emperor's approbation, and thenceforward became a rich man. It was finished, and now is the safest and best road in Europe, and capable of being run at a speed of fifty miles per hour, but rarely worked to that gauge. The London and Liverpool Road is built on a very direct line, and is second only to the Russian. The saving in the wear and tear of machinery and time is of immense value, and should constitute a *prime object in* the construction of railroads.

North Georgia is partly divided by the Blue Ridge, which enters the state in Rabun County, in the extreme north-east corner, and runs south-westward half way through the state, where the mountain chain sinks beneath the cretaceous and tertiary formations between there and the Gulf of Mexico. Northwestward the primary non-fossiliferous rock extends into Alabama as far as Autauga County, producing the beautiful falls on the Coosa and Tallapoosa Rivers. Here the great southern gold-field ends.

Whilst North Georgia comprises forty counties, North-east Georgia is made up of only fifteen counties, which cover a territory of seven thousand square miles, one half of which is traversed by the Appalachian Mountains, whose various offshoots and outliers form innumerable intermontane valleys of the most lovely description, yielding every variety of agricultural product in the greatest profusion. From the trend of the mountains the upheaved strata form thousands of waterfalls, equal to the manufacture of the various products of this rich section; in addition to which the charming landscapes, the magnificent scenery, and the sublime accompaniments of mountain grandeur, elevate the mind and fill the soul with the most exquisite and indescribable emotions, bringing man into close communion with his Creator and Preserver.

The altitude of the valleys range between fifteen hundred and two thousand feet, and, being between latitude thirty-three degrees forty minutes and thirty-five degrees north, gives it one of the most delightful and healthy climates in the world. The temperature in summer has a mean of eighty degrees, and in winter forty degrees, though occasionally we have a "cold snap" for a few days, when the thermometer sinks to twenty degrees, and has twice, in the last fifty-six years, gone down to zero. The first was called the cold Saturday, which happened on the 3d day of February, in 1835, when several persons were frozen to death, and most of the orange trees were killed as far south as Orange Lake, in Florida. The snow fell, on the night of the 1st and 2d, to the depth of twelve to eighteen inches in North-east Georgia and Tennessee, and continued for over a week, affording fine sleighing and skating. In 1852 we had ice three inches thick, both on the 15th December and the 15th January, with six inches of snow; thermometer at ten degrees. On the 23d December, 1870, the thermometer was at zero, and one degree below the next night, without snow, except a light skiff, and little or no wind. The cold Saturday the wind blew from the north-west a perfect gale for forty-eight hours. This *spell* has most probably destroyed the orange trees again. The nights in North-east Georgia in summer are always cool and invigorating, sufficiently so to sleep comfortably under cover. No mosquito-bars or nets are required to protect the sleeper from these annoying and troublesome insects, which are so great a curse to the low country.

The quantity of rain which falls annually would lead foreigners to the conclusion that it was anything but a pleasant climate, but most of the rain falls in the winter months. There are quite as many clear days in the year as any country has, and far more than in Middle and Northern Europe. Though the depth of rain which falls in the southern part of North-east Georgia is forty-seven, and at Dahlonega over sixty, — three times as much as falls in London, — yet no malarious diseases prevail, and but few pulmonary complaints, except those brought from other parts. The only diseases are pneumonia, pleurisy, and rheumatism, the effect of undue exposure and sheer recklessness. A healthier and more robust population never lived in any country, nor a more orderly, religious, and humane people, with a fair share of intelligence and industry, and a hospitality which is proverbial.

CHAPTER VII.

FANNIN COUNTY AND DUCKTOWN COPPER MINES. — IRON. — MARBLE. — TALC. — PRIMARY FORMATION. — IRON MOUNTAIN. — WATER POWER. — CASHMERE GOAT. — STONE MOUNTAIN. — KOKO CREEK GOLD-FIELD, AND DIAMONDS. — NACOOCHEE GOLD MINES.

ALL North Georgia, except ten counties, and the half of five others in the north-west angle of the state, adjoining Alabama and Tennessee, is of primitive, non-fossiliferous formation, which, on the north-west, alternates with the taconic, in which are situated the Ducktown Copper Mines, in East Tennessee, and extending into Fannin County, Georgia. They have recently been reopened, and, as yet, but superficially explored. Seven have been opened to the depth of fifty to one hundred and twenty feet, one of which is in Georgia, being a continuation of the same veins, called the Mobile Mine. The deepest shaft is eighty feet, where the vein is seventeen feet thick of ore, worth from fifteen to twenty per cent. When first discovered, the ores were put up in boxes, and hauled fifty miles to railroad, and thence to Savannah, and from there by ship to Baltimore, where it was smelted!

Several years afterwards, furnaces were erected on the ground, and the ores smelted, and the copper only hauled to transportation. In a few years three railroads will reach this rich mining district — one from Wilmington, N. C., to Chattanooga, Tenn., another to intersect there from Dalton, and a third from Marietta or Atlanta, which will not only give the miners transportation, but a cheaper fuel from the coal-fields of Georgia, Alabama, and Tennessee to smelt their ores. It is one of the richest copper and iron districts in the United States, and accompanying it for fifty miles is a lead of "argentiferous galena" of superior quality. The vein has been opened at two points by a single shaft to the depth of thirty feet, near Murphy, where it is five feet thick, and assays one hundred dollars per ton. Close by is a ledge of white marble on the south, and in close proximity on the north an immense body of iron ore, which constitutes the great iron-fields on the southern slopes of the Iron Mountain range, which terminates in Georgia. This inexhaustible body — the best of iron — extends for one hundred and fifty miles. On the south side of the marble is a lead of pure talc, or pyrophyllite, which was before mentioned as the counterpart of the Deep River "agalmatolite." It is here from twenty to two hundred feet thick, striking into Georgia in Fannin County and Murray, where it takes the name of soapstone, or pyrophyllite, from its being composed of sixty-three silica and thirty-three magnesia, whereas the Deep River agalmatolite contains sixty silica and thirty *alumina*, with three per cent. of potassa.

The chemical composition of the pure Georgia mineral renders it a valuable *lubricator* for heavy machinery, as well as carriages and wagons, in addition to its other uses, for it has not a particle of grit in it; and must become ere long an important article of commerce.

The copper veins of Ducktown and those in Georgia are nearly vertical, and strike north-east and south-west. For the first forty to seventy feet the veins are composed of a mass of hydrous oxide of iron, at which point a bi-sulphuret of copper sets in, from eight to twelve, and in some places twenty feet, which yields from twenty to forty per cent.; and in some lodes the large proportion of black oxide increased it to sixty-five and seventy per cent. It is this black oxide which gives character to the ore above the water-level, or line of decomposition. This section, of all the veins, is the same from the outcrop to the water-level, without regard to depth, being a spongy oxide of iron, from which the copper has been carried off by decomposition and infiltration, leaving this mass of iron, called by the miners "gossan."

At forty to seventy or eighty feet you reach this bed of bi-sulphuret, which is, with few exceptions, the only ore that will pay a profit until the facilities of railroads and coal are obtained. This ore rests on a very poor sulphuret of copper and iron, worth about two per cent.; this rests on the yellow sulphuret, or chalcopyrite, which extends indefinitely, and pays from twenty to thirty per cent., in a quartz gangue. The other ores occasionally found are malachite, red ruthite, and stephensonite, the latter produced by recent combinations. The veins vary in width or thickness from five to thirty feet, situated in a hilly country, surrounded by mountains, which appears to have been the bed of an intermontane lake of considerable extent, from the beds of water-worn quartz pebbles, which are observed in various deep ravines and river-beds. The surrounding mountains are about fifteen hundred to two thousand feet high. The northern portion constitutes the copper region; but the southern, and much the most extensive, is metamorphic, and rich in gold veins.

The Iron Mountain range is semi-metamorphic, and divides this formation from the taconic and silurian groups, upon which rests the great carboniferous system, stretching westward for two thousand miles to the Cordilleras range, spanning the Mississippi Valley, and vast table lands of the Rocky Mountains, producing those exhaustless coal-fields which are so indispensable *to man.*

The copper mines before the war employed from five hundred to one thousand miners; but since that sad and destructive event but few of them have been reopened, for want of capital and suitable labor. As soon as the railroads shall have been completed, at least two thousand will find immediate employment; and the opening of the coal region by rail will cause the silver, iron, and lead mines to be worked on an extensive scale. Their richness justifies the belief that at no distant day they will employ ten thousand miners. Then these ores will pay as good profits as the Colorado or California mines, or those of Lake Superior or Nevada. In fact, much higher dividends may be counted on, in consequence of the cheapness of raising the ore.

All this intermontane country, which constitutes the "Switzerland of Georgia," is rich in various kinds of metals, except tin and platinum. Its timber, for carriage and wagon-making, furniture, and all mechanical purposes, is nowhere surpassed. The valleys and mountain-sides, to their summits, are clothed with the heaviest and finest timber, and a carpet of the richest of grasses for stock-raising. The beef, mutton, venison, and fowl are unsurpassed, and capable, with proper facilities, of furnishing the wants of millions.

The Cashmere goat has recently been introduced into Georgia from Asia, from the celebrated Cashmere *Valley, in the Himalaya* Mountains, of the same altitude and latitude with North-east Georgia. For several years they were sent to various parts of the West and South, but generally failed to realize the expectations of the experimenters. But in the valleys of North-east Georgia they are found to be particularly adapted to the climate and soil, and will, from necessity, become a leading feature in the agricultural products of this section. Luxury and fashion must and will have their demands satisfied in any age and country. Among her wants stands unrivalled the Cashmere goat, which furnishes not only the table to satisfy the most fastidious appetite, but the wants of woman, in gratifying the extreme of fashion, and the transcendent embellishment of her person with garments which no other fabric can compare with for elegance or magnificence. That settles the question; for the world, or life, without the approbation and smiles of woman, becomes a blank — a nameless entity.

The water power north-west of the mountains is boundless, and will require ages, if not centuries, to bring into active use. The western limit of the non-fossiliferous rocks is quite irregular, corresponding to the usual varied indentations of the ancient ocean coast-line during the carboniferous age. From the Unaka Mountains it runs southward through Fannin County, Gilmer, Pickens, and Cherokee, about equally dividing them; thence south-west to the Alatoona Mountains on the Etowah River; thence through

Van Wert, in Paulding County, and onwards by the Dugdown Mountains to the Alabama line. The Blue Ridge, as before stated, forms the great anticlinal axis of the Appalachian chain, and altogether distinct from the Alleghany range. The stratum on either side dip at an angle of forty to forty-five degrees, some districts for miles in extent as high as sixty, seventy, and even vertical. The width of the belt comprising this axis is from one hundred to one hundred and fifty miles, and in some parts between this and minor axes the stratum is undulating from twenty degrees to horizontal, forming *cloak veins*. The Elrod Mine, in Hall County, was one of the first veins found in the state, and yielded very large profits for years, by a system of mining so simple and wasteful that a miner is astonished they made anything. It is a *cloak vein*, and, I believe, the only one in the state, caused by being immediately on the anticlinal axis of upheaval, and for twelve miles the south-eastern section of the upheaved stratum broke off, and fell into a horizontal position, undulating with the protruded rock, and forming the cloak vein at the Elrod Mine. We have previously expressed the opinion that this vein, properly worked, would yield large profits. Its altitude above the water-level is about ninety feet, and by ditching the creek for two miles, the water can be brought within two hundred yards of the surface to be washed, and the results would be altogether satisfactory, independent of the vein ores, which in some sections of the vein are enormously rich. The expenses necessary to fully develop this vein will not exceed five thousand dollars. A steam engine of thirty or forty horse power, at twenty-five hundred dollars, a pump at one thousand dollars, and a perfect mill at fifteen hundred dollars, will enable any operator to fully develop the Elrod Mine, with the assurance that it will be a splendid success, provided the operators are practical miners.

The outcrop of the elastic sandstone and granite forces the Chattahoochee River abruptly from its south-east course down the Oconee Valley, in a south-west direction, for two hundred miles, and thence into the Gulf of Mexico, instead of the Atlantic. This gives a topography which will some day be improved by a canal, which can be constructed very cheaply. These striking lines of disruption prove the upheaval of all these ranges by the same volcanic force.

From Walker's Mountain, in Hall County, to the Stone Mountain in De Kalb, the Appalachian chain sinks beneath the metamorphic stratified rock for sixty miles, when it again appears in the majestic and sublime cone, near Atlanta, called the *Stone Mountain*, rising proudly to the height of twenty-three hundred and sixty feet, — a single block of granite without vegetation, — constituting one of the grandest natural *curiosities in the* world. It is seventy miles from the

Blue Ridge, and, from its being a cone, led the English traveller Hawkins, in 1808, to believe it to be artificial. His opinions were based on the report of others, who gave extravagant accounts of it, so characteristic of the Indians, as he had never seen it. His published notes of travel led the president of the Academy of Arts and Sciences, in Paris, to believe it artificial; and he addressed a letter of inquiry to the Hon. R. W. Habersham, of Savannah, for a description of the dimensions of this vast relic of architectural grandeur! At that time the startling developments of the corps of *savants*, accompanying the great Napoleon in his Egyptian campaigns, were rife throughout Europe, and all classes were clamorous for further light on the subject of our ancestors.

This mountain is of granite, situated sixteen miles from Atlanta, on the Georgia Railroad, and from its foot-hills furnishes immense quantities of the finest building material. The company who own it receive handsome dividends already, and look forward to a time when it will be in much greater demand. As population and wealth increase, the more substantial and elegant become the improvements and style of living.

This has been the history of all people and nations for three thousand years: First the tent of the roving hunter; then the rude shanty or hut of the semi-agriculturist; then the more elegant frame building; the more substantial mansion of brick; and, when wealth and power prevail, the last and crowning effort of the civilized being is to erect a palace of granite or marble, which will be not only a home for him and his family whilst here on earth, but a monument to preserve his name from oblivion.

The magnificent system of railroads, either built or in process of construction, will afford all the facilities of transportation necessary to the perfection of the highest system or order of architecture; and the citizens of Georgia, at the age of two centuries, will enjoy the benefits of progress which required two thousand years for the European nations to attain.

In Lumpkin County, the spurs of the Iron Mountains basin unite with the Blue Ridge, and produce a false impression in regard to their age, most writers believing that the Blue Ridge is deflected westward and north-westward to the Coahutta Mountains, in Murray County, on the borders of Tennessee, which is not true, but positively disproved by the fact that the Blue Ridge is of plutonic origin, whilst the Coahutta is taconic, and the Dahlonega Mountains are highly metamorphic — the former fossiliferous, and both stratified. The true Blue Ridge, as before shown, sinks below the stratified metamorphic rocks, or first sediments, in Hall County, and, except the Stone Mountain, and its outliers, is lost under the cretaceous and tertiary beds of Alabama. The Unaka range is semi-metamorphic, yet there is a very limited gold-field in the region between that and the Chilhowee Mountain, on the head-waters of the Tellico River, of about sixty square miles, which is traversed for six miles with a ledge of itacolumite or flexible sandstone. During the deposit gold washings, from 1828 to 1848, several beautiful diamonds were found in the rifflers of the gold machines; but the ignorance of the miners brought no benefit to them from that source, and the poor yield of gold caused the miners to go to more profitable regions. On the south side of the Unaka or Iron Mountains, as far as the Blue Ridge, are many gold, silver, and copper veins, some of which have been worked profitably to the water-level during several years; but all of them have been abandoned. The formation is mostly metamorphic, with occasional alternations of granite, feldspar, hornblende, and gneiss. In this region, we conceive no richer mining region to exist, if worked by competent practical and scientific miners.

South of the mountains the mines have paid much better profits, and been more extensively worked, and by persons, in many cases, well qualified to succeed. All the region from Carolina to Alabama, and from the mountains to the tertiary and cretaceous formations, — a distance of four hundred miles by one hundred and fifty, — is probably one of the richest mining regions in the south. The yield has always been uniform and remunerative with the most imperfect machinery, and without system or capital. The mines at Nacoochee, where gold was first discovered in 1828, have yielded very good profits, and in many cases they were enormous, ranging from two thousand dollars to three thousand dollars per hand, without a dollar of capital invested. This was made on leases in the deposits in the small streams, easily and cheaply accessible; but they have been long since exhausted, and now it requires capital to prepare and open the alluvial deposits of the river bottoms or lands, or to work the veins which, by their decomposition, have formed the deposits. It requires engines, pumps, mills, &c., which, in the present impoverished condition of the country and people, is wholly impracticable; and the mines must lie dormant until the completion of our railroad system, which will bring enterprising men, with the means necessary for their development. When a few shall have re-established the fact that money can be made in that line, then others will come, and our country will be fully explored, and made to yield its immensely rich hidden treasures for the use of man. Owing to the want of these means, all of our miners and laborers have gone to Colorado and California, where they can get better employment, and accumulate enough to commence again.

CHAPTER VIII.

QUALITY OF GOLD IN GEORGIA. — TRUE AND SEGREGATED VEINS. — LOUD MINE. — OCTOHEDRAL CRYSTALS OF GOLD. — THE GEOLOGIST WERNER. — SIR R. MURCHISON'S THEORY OF THE ORIGIN OF GOLD FALSE. — POTOSI MINE IN HALL COUNTY.

THE gold in the Georgia mines is far above the general average in quality, ranging from nine hundred and twenty to nine hundred and fifty, and, in some districts as high as nine hundred and ninety-six and nine hundred and ninety-eight — the finest in the world. Rabun County, in Georgia, and the Horse Cove, in North Carolina, claim pre-eminence in this respect. Carroll County stands very high, and proves what we before stated, that there were but few "true or fissure" veins in Georgia. The assay of that of the Loud Mine is eight hundred and fifty, the Potosi seven hundred and fifty to eight hundred and ten, and the Harris Lode six hundred to eight hundred. The gold of the so-called segregated veins, in this state, was precipitated from solution in a menstruum of high *temperature*, *by* chemical reagents, cotemporaneously with the enclosing strata, which accounts for the superior fineness of all the gold in districts where there are no fissure veins. All the gold in the sedimentary layers, or veins, as they are now called on account of their highly inclined position rather than any vein characteristic they possess, is of the same quality and character, and they all have the same dip and strike with the enclosing strata, — for they cannot be called *walls*, — and most certainly were deposited cotemporaneously in a quiet sea-bed in a horizontal position. The volcanic heat that upheaved these innumerable layers, and protruded the plutonic rocks to form the mountain chains, metamorphosed the rock, and left the layers, or strata, as we now find them, highly inclined, and the gold strata, silver, lead, or iron, as the case may be, enclosed between them, and called "segregated veins." They have the appearance of veins, without any of their characteristics. They have no walls, and no adventitious minerals, aside from the matrix. In the true veins they traverse the strata, when in metamorphic rock, and of course were formed after these rocks became hardened; and the walls are not only well defined, but plainly marked by volcanic action; the gold (if a gold vein) always more or less alloyed with silver and other metals, and of lower quality, with the frequent occurrence of crystals, which do not obtain in the sedimentary interstratified veins *or layers*. Another striking feature is, that massive gold is only found in fissure veins, proportioned to the causes existing during the different epochs, being greatest in the taconic or Cambrian age, when organic life first began to appear. In this system of rocks we find massive nuggets of several pounds — from one to twelve. At the Ried Mine, in Cabarras County, N. C., was found one nugget weighing thirty-seven pounds, and in Australia and California masses of one hundred, and one of one hundred and sixty, pounds have been found.

The fissure veins in the southern gold region sometimes extend into the permian and cretaceous formations, and in the Rocky Mountains in the tertiary. The first class evidently were formed before the close of the carboniferous epoch. The quality of the gold from the western side of the continent is far from being as fine as the eastern, for the reasons just given, that the volcanic forces acting on the two slopes were four times as powerful on the Pacific slope as on the Atlantic, and consequently produced more fissure veins, and elevated the mountains higher. The same laws operated to produce the same effects in Asia, Australia, and part of Africa.

An immensely rich vein of the first class must exist at Nacoochee, where several millions have been obtained from the deposits, all the gold of which is of fine quality. But the gold twelve miles south-west *from there*, at the Loud Mine, only assayed eight hundred and fifty, proving the existence of a fissure vein of more recent date. The veins of White County have not been worked more than one hundred feet in depth, for want of capital and scientific knowledge. The Sprague Mine and the Lewis Mine are one and the same vein, but heaved off for three thousand feet, placing the Lewis section out of parallel strike. These two mines have been very profitably worked for thirty years, until the war put a stop to the operations, and afterwards they fell into the vortex of "northern fancy stock speculators;" and, after spending one hundred thousand dollars in useless machinery and profitless developments, the whole organization culminated in bankruptcy, and now is being sold out by the sheriff. A richer or better paying mine does not exist on the North American continent. The superintendent never worked a particle of the vein, except "dead heads," which exist in all mines, and were left in these because they would not pay. As before shown, the veins, which by their decomposition made the deposits, are mostly interstratified with the oldest sediments, such as micaceous slates, talcose slates, flexible sandstone, and resting upon granite; and where gneiss comes in contact with granite, it is frequently recrystallized in granitic form, and so blended that it is impossible to distinguish it from the other. One vein in Lumpkin County, called the "Boly Fields Vein," is in hornblendic *gneiss*, and evidently deposited cotemporaneously with the enclosing strata. The matrix of the vein, or seam, is quartz, with massive gold, accompanied with the rare and beautiful "tetradymite," which occurs in no other mine in Georgia. This vein, or stratum, must have been deposited with the earliest sediments, and contradicts the theory of Lyell, Murchison, and others, that the *interlaminated*, or rather *interstratified* veins, which they term "segregated," were made by *volcanic* or *eruptive force.* This theory, that the metamorphic, non-fossiliferous rocks include the micaceous, talcose, and chloritic slates, is false.

The first sediments, not only of the rocks, but of the metals, were produced by chemical precipitation before there was any organic life in the world; and the gold veins or strata of that series were formed in the same way, and necessarily cotemporaneous with the pyrocristalline stratified rock of the metamorphic or primary non-fossiliferous system, where they invariably exist, and *never traverse* the formation. The next class of gold and other metalliferous veins were formed millions of years after those we have been describing, and constitute the *true* or fissure veins.

The volcanic force which upheaved the mountain ranges, and lifted up and disrupted the sedimentary strata with the metalliferous veins, and left them in their highly inclined position, at the same time produced numerous fissures in the contiguous rocks for *hundreds of miles*, which were filled with such metals and chemical combinations as existed in proximity to the fissure, either in a fluid state, combined with the gangue or matrix, or in vapor, which by condensation, by electric agencies, produced the various sulphurets, chlorides, &c., which now characterize the veins.

The third class of veins are formed in the taconic and silurian formations, and sometimes extend into the tertiary. Of this class are those of Montgomery, Stanley, Cabarras, and Union Counties, N. C., and the youngest veins belong to the tertiary, when the Rocky Mountains were pushed up to their present height. This is quite apparent from the sedimentary, miocene deposits resting high up on the granite and gneiss of that chain, proving the deposition of that formation in a deep sea bed before the upheaval of the mountains. These facts not only prove the recent formation of the Rocky Mountain range, geologically speaking, but prove that the Appalachian chain was elevated countless ages before the mountains of the Pacific coast. The dip of the metamorphic rocks, the superposition of the strata, its non-conformability, and other strong marks, prove the two ranges to have been elevated by different volcanic cataclysms, millions of years asunder, and necessarily producing different combinations in the metals, which are everywhere shown by the different quality of the gold in the veins of each period, not only on this continent, but on the eastern.

The prevailing theory of the formation of the hypozoic rocks and segregated veins is without a particle of foundation, and the opinions of the celebrated Werner were equally subject to insuperable objections. His knowledge of the subject was formed entirely on his knowledge of the Hartz Mountains, in Germany, which subsequently was proved to be erroneous; but he clung to his flimsy and crude notions with a tenacity worthy of a better cause, only equalled by his inexplicable antipathy to the mechanical part of writing. This was so great that no persuasion of his large, and, in many cases, distinguished class of scholars, could induce him to write a line on his favorite science of geology. It amounted to a high degree of idiosyncrasy.

We will relate a very striking case, which ended in his death, and shows the irresistible power of prejudice, which caused much trouble and suffering. On this occasion his only sister, by misfortune, was reduced to absolute want. Being a widow, with a large family of children, she found herself totally unable to supply their wants. In this emergency, she decided to go to Paris and see her brother, and crave his help. The distance was great, and in those days there were no railroads. Having no money, she bade adieu to her children, and, with a heavy heart, travelled on foot for days and weeks. When she arrived at the great city of *Paris, the* centre of fashion and the metropolis of conti*nental Europe, she* found her only brother in the midst of his rocks and minerals, his students and books, perfectly absorbed, and lost to every sense of humanity, of charity, or of kinship. She begged in vain from day to day, for weeks, for aid, but to no purpose; when an only uncle, by a seeming providence, died, and left a handsome competence to his nephew and niece, which could now be speedily obtained, and thus save her starving children, by simply complying with the usual forms of law, which she had drawn up, as required by the prefect, and signed, when they called on her brother to sign the instrument, or bond; but his antipathy to writing was so great that he delayed and evaded, from week to week, for four months, when, despairing of help from him, she determined to leave for home, and starve, with her children. She called on him for the last time. He relented, and ordered her to call in the prefect, and with a spasmodic effort signed his name to the bond, and soon fell into convulsions, and died in a few hours. Thus passed away the spirit of the immortal Werner, and his suffering sister was relieved. He was a great man in his day, and one of the first, if not the first, to establish the science of geology on a rational basis. If he had travelled as extensively throughout all quarters of the world as Humboldt, Murchison, or Lyell, he would have changed his opinions relative to the formation of the different rocks, and coincided with those high authorities. We by no means indorse the whole theory, or rather *local* ideas, of Werner; but many of his opinions are now adopted as the basis of the grand superstructure of the temple of geological science which must govern modern mind. Hutton and his followers perfected the system; and now we have a science predicated upon a basis of law and facts which are *immutable*, and plainly seen, and fully appreciated by the commonest minds.

Even the most distinguished modern geologists are changing their opinions upon the age, as well as manner of formation of several groups of rocks.

The theory of the origin of the distribution of gold by Sir Roderick Murchison, which is adopted by nearly all European and American geologists, is certainly erroneous. He says, "The older azoic slates and rocks were impregnated with gold during the deposition of the secondary and tertiary groups; but after that time, the protrusion of the eruptive rocks introduced the gold." Thus he says gold was brought up from the interior of the earth a little time only (geologically speaking) before the appearance of man. Fish, lizards, and crustaceans did not need it, and it was delayed till a being was about to be created who did. But the Bible, and practical facts in mining geology, in this country at least, prove this theory to be false, and predicated on the prejudices of early education. As before shown, all the *interstratified layers or veins*, as they are improperly termed, are without what miners call walls, and wholly wanting in any of the distinctive and marked characteristics of *fissure* or *true veins*, and, having the same strike and dip with enclosing strata, must evidently have been deposited cotemporaneously with it — the additional fact that the gold is nearly pure, whereas that from the *fissure veins* is always alloyed, and associated with other metals in the state of sulphurets, phosphates, and carbonates, many of which are never found in the sedimentary or interstratified repositories. Professor Shepard is of the opinion that the gold was "segregated" by a kind of electric or *sweating* process, by which the sublimated metal was brought to form what are termed segregated veins; all of which reasoning, though beautiful and interesting in a scientific point of view, is utterly unsupported by facts. Another assertion of Sir Roderick, that gold veins become poorer and less remunerative as they are opened deeper, is also without foundation. As before shown, the sedimentary deposits of the *metals* and *minerals*, *stone-coal included*, were not upheaved and placed in the situation they now occupy until long after their formation, and at a comparatively late period, and then the first class of *true* or *fissure* veins were formed; and during the long period of the carboniferous deposits, decomposition progressed rapidly, and liberated the gold and other metals, either in metallic *form* or as oxides, &c., for subsequent combinations; and the next plutonic throe produced the younger system of metalliferous veins, and what are called placer or diluvial deposits. The latter term carries the idea that they were the result of Noah's flood or deluge, which is not sustained either by geological facts or the Bible, when properly translated. No evidence exists in America or Europe of a universal deluge, and it would have been unjust and inconsistent with the principles of God's nature or attributes to exterminate the inferior species of the human family for the sins of others, except such as sinned.

The gold from the decomposition of the primary, sedimentary, or interstratified veins, and from the first class of veins formed, those extensive deposits found in Georgia, were formed, which is proved by the fact that the gold, where there are no fissure veins, is far richer than in their vicinity, because where they exist the gold is mixed and of lower quality.

Fissure veins are much more numerous in North Carolina than in Georgia, and porphyry is very common: frequent and sometimes immense dikes of porphyry extend for miles. In Georgia they are very rare.

In the neighborhood of the Stone Mountain there are porphyritic dikes and metalliferous veins of gold, *iron, and* lead, much more numerous than any district *in the state.* On the west side of the great central axis there are fewer veins than on the east, and fewer veins in the taconic and silurian strata than the metamorphic. The gold in the taconic veins being always massive, and when circumstances and temperature justify it, always yield perfect crystals, which prove them to be of a different age than the interstratified veins of the azoic age. Besides this fact, the gold is from fifty to one hundred and fifty thousandths finer than that from fissure veins. Another proof, which should be strongly borne in mind, is the fact that they never occupy the same position, but always maintain the same *strike and dip as the enclosing rock*, and for miles the same vein yields the same kind of gold, though no two veins correspond in this respect, as they must necessarily have been deposited at different times. All these facts combine to prove the opinion expressed before, that the pyrocrystalline interstratified veins were formed cotemporaneously with enclosing rock, by the same chemical agencies that formed the oldest sediments, and when the irruptive rock upheaved and formed the mountain chains, disrupting the already hardened sediments, and elevated them yet higher, then the veins and enclosing rocks were *crystallized*, as we now find them, and the same force or agent produced the *true veins*, radiating into the adjacent metamorphic rock.

The paucity of this class of veins in the south-*eastern part* of North America is owing to the dif-

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ference of electric forces on the opposite sides of the continent, those (as before shown) acting with four times as much power on the Pacific slope as on the Atlantic. The height of the mountain chains, as well as the greater number of plutonic or true metalliferous veins, combines to prove this.

To account for the various phenomena attendant upon the formation of our gold veins is not only difficult, but as yet not fully satisfactory. Our most distinguished geologists indorse the theory of Sir R. J. Murchison, that the metamorphic slates and shales are eruptive or plutonic, — their stratification caused by being crystallized *under heavy pressure*, — and were impregnated with gold, which, by segregation, aided by the fluid matrix, and electric currents, formed those so-called veins. The veins which aided in forming those rich deposits at Nacoochee, and known only by its massive gold, belongs to the first class of true veins, and from the deposits in a line of gulches and branches, nearly at right angles to the trend of the strata and interstratified veins, proves its locality, independent of its eruptive accompaniments.

But the usual false economy characterizes the owners, and they refuse to incur the expense necessary to its development, or compensate private parties to find it. The deposits from this source were about *half a million*. The predominant rocks are granite, *gneiss*, *micaceous* and talcose slates, with a large dike of hornblende rock, which evidently was formed when this fissure vein was made, traversing the strata at nearly right angles. Another similar vein exists twelve miles south-west from here, called the Loud Mine. The gold from its deposits is found in masses of considerable size, some of which weighed five pounds, and from the alluvium of the creek in the immediate neighborhood nearly *two tons* were washed out; yet no attempt whatever has been made, by the owners, to find the vein which made so rich a deposit. Such are the ignorance and false economy of the mass of mankind, who fail to learn the fact that the laws of God never change, and that "like causes produce like effects." Consequently, when this vein is found and opened, it will correspond with the deposit in richness, and with all similar veins which have been opened in this and other countries.

From the peculiar character of the gold, the prevalence of plutonic rock, and corresponding indications of the ravine deposits, no doubt exists as to the situation of the vein, which could be found, and satisfactorily developed, at a cost of only a few thousand dollars, with every evidence that it would yield millions. This and the Potosi Mine, in Hall County, are the only ones that yield octahedral crystals of gold, in the state. The Loud Mine also yields the most beautiful and perfect filiform and arborescent crystals imaginable.

CHAPTER IX.

HYDRAULIC WORKS. — YAHOOLA COMPANY. — NACOOCHEE VALLEY. — SOURCE OF THE SAVANNAH RIVER AND TENNESSEE. —RABUN GAP. — ASBESTOS. — CHALCEDONY AND CARNELIAN.— TALLULAH FALLS. — TOKOA FALLS. — HABERSHAM COUNTY. — HARRIS LODE IN HALL COUNTY.

IN White and Lumpkin Counties the California hydraulic process is now used for washing for gold. The canal which conveys the water to the placers of Nacoochee is seventeen miles long, and terminates at an altitude of three hundred feet, giving the miners every necessary facility and power to wash off the hills and surface-grounds for miles around. The other canal brings the Yahoola River from the mountains, about twenty miles, to the neighborhood of Dahlonega, at about the same altitude above the river-level as that at Nocoochee, and two thousand and sixty-four feet above tide water. In its route the canal crosses the Yahoola Valley in large cast-iron pipes three feet in diameter, which span the valley and convey the water to the plateau on which Dahlonega stands. These *large iron siphon* pipes sink down from the level of the canal two hundred and forty-eight feet, and cross the valley, and rise up to the canal-level on the opposite side, and then the water is carried in the canal through town and onward to the gold-fields, where it is used in various ways to procure the gold. This gigantic project cost half a million dollars, but during the war suffered greatly, and is now but feebly prosecuted; yet no doubt exists in regard to its ultimate success. The power obtained by the hydraulic process, with a head of water of one hundred feet, is estimated, by practical miners, to be equal, in washing off the surface earth, to thirty times that of one hand without extra power. The water is brought from the canal, down the slopes of the hill, to the gold placers, and issues from the nozzle of a pipe from one to two inches in diameter, the force of which dissolves the clay and partially decomposed slates with magical rapidity. Accidentally striking a man or animal, they would be killed in an instant. The works at the Nacoochee Canal are paying good profits to the company, who mostly live in Boston. Even they, with their boasted intelligence and wealth, have made no attempt to work the rich veins they continue to find by surface washing, and which have yielded, ready for the mills, without cost, thousands of tons of better ore than any of the numerous mines in California or Colorado.

This culpable apathy, in a measure, arises from false notions of the political status of the country, which is represented by designing and unprincipled politicians to be unsafe for any one to live in, or do business in, who does not belong to the rebel element of the state. No community in any part of the world is freer from crime, or has a more orderly, law-abiding, conscientious, or hospitable population, who are not only desirous of having good citizens from the North, or any part of the world, to come and settle among them, but will, in many instances, give them a bonus in lands to induce them to come here, and help develop the vast, but at present almost useless mineral wealth of Georgia.

Four elegant diamonds were found in the gold-washings of Nacoochee, and two near Loudsville. One of these diamonds was lost before the miners had any knowledge of its value. From its size and lustre, as compared with those found afterwards, it must have been worth one hundred thousand dollars. Another was broken up by the negroes to see what made it shine so! This, from the description of the miners, must have been quite as large, and weighed at least twenty carats. A third was given, as a handsome specimen of something, he knew not what, to a general post-office agent, who most probably lost it, as he had no knowledge of its value. The others are still held by the finders in the rough state. The valley of Na*coochee* lies between the Tray Mountain, five thou*sand feet high*, and the Yona Mountain, four thousand feet high, and is considered by all foreigners to be one of the most charming and lovely valleys in the world. It is in a high state of cultivation, and improved by elegant residences, orchards, vineyards; and many of the choicest modern works of art in statuary and sculpture are being introduced from Italy to add to its beauty. Its inhabitants are natives of Massachusetts, Indiana, Virginia, Georgia, the Carolinas, and some from beyond the seas. They are pious, intelligent, and hospitable, and have yet to learn the cursed influence of European modern philosophy. They are mostly engaged in farming, mining, and stock-raising, all of which pays a satisfactory profit to the operator, because he is practicably acquainted with his trade or pursuit. The Yona Mountain is an isolated peak of granite, four thousand feet high, forming a magnificent cone, whose crest pierces the summer clouds, and affords one of the most sublime and interesting scenes in the state. It is in this and Rabun County that the Savannah River has its source, and flows south-eastward, over one continued series of falls and rapids, for two hundred miles, to Augusta, where it gently winds through the wide tertiary formation to the ocean.

Within a stone's throw of its head-spring is the source of one of the largest sub-tributaries of the "Father of Waters," which rises on the east of the *mountains in Georgia*, and flows through Rabun Gap, where the mountain chain has been reft in twain by a mighty convulsion of nature, and gave passage to the Tennessee, which rushes onward through the Appalachians, the Unaka or Smoky Mountains, the Chilhowee, and Cumberland ranges, and then gently flows through the rich plains of Alabama, Tennessee, and Kentucky into the Ohio River at Paducah, which here is one mile wide. Onward the mingled waters of the two mighty rivers move to join the turbid waters of the Mississippi at Cairo, where the union is witnessed by the three great States of Kentucky, Illinois, and Missouri. Onward again the three mighty currents roll for another thousand miles to the Gulf of Mexico in Louisiana.

Thus the waters of the rain-storm separate in Georgia, and while one part quickly reaches its destination in the Atlantic Ocean, the other travels through the territory of ten states, through five of which she meanders before she unites with the rivers of the Mississippi and Missouri, whose turbid waters had already wandered from the far-off west in the Rocky Mountains, in Idaho, and now with sublime power rush onward with irresistible force to the sea, where they rest until called on by tropical heat to be raised to form clouds, and by electric currents wend their way back to the mountain slopes to be condensed into rain and dew-drops, and again and again perform their *ceaseless rounds* for the benefit of man. But to return to Georgia. The source of one of the largest sub-tributaries of the Mississippi being east of the mountain range, in Georgia, is a great natural curiosity, and one of the most singular geological features found to exist in any country.

Near this point are two localities of amianthine asbestos, which will be of value in the arts as population increases, and the demands of society require to be satisfied. At present its use is confined to the construction of incombustible lamp-wicks, the packing of money-safes, also in dentistry, and for cabinet specimens. Ere long the rapid progress of invention will open up new uses for it, and largely enhance its value, which is now merely nominal, being about twenty dollars per ton. The largest bodies of it are in Fulton County, in Georgia, and Chambers County, Alabama; but the finest fibre, and decidedly the most elegant and pure variety, is found in Rabun County, Georgia, and Macon County, North Carolina, where are also found the carnelian and chalcedony, which is in dikes of basalt and greenstone in great abundance, and of fine quality. Though a cheap precious stone now, it once held a high rank, and was used by kings and queens in all civilized nations, not only for ornaments, but for intaglios and cameos, and various other purposes; but from its great abundance the price has been gradually reduced from age to age to almost nothing.

Chalcedony was unknown to the Roman people in Pliny's time, as his gem of that name, found in the copper mines of Chalcedon, was of a green color, and doubtless nothing more than silicious malachite. Theophrastus says they were never large enough for ring-stones, but used for soldering gold. This proves that Pliny's gem was not malachite, for that occurs massive, is frequently found in the old permian kingdom, in Russia, in masses weighing several tons, and is used in furniture, and for doors to the palace of the czar. In Georgia, and I believe elsewhere in the United States, it is rare, but is found in small crystals in all the mines, particularly of the silurian group. Our chalcedony is a semi-transparent quartz, slightly tinged with yellow or blue, and is frequently mistaken by the best of judges for the opal, which, however, only occurs in the tertiary formation. But this must not be mistaken for the "asteria" of Pliny, which was an East Indian sapphire, and altogether of another family of gems, and of much greater value and brilliancy, as well as hardness. Carnelian, or sard, was first brought to Greece and Rome from India by the traders of the Red Sea, where Plato (Phædo, p. 110) describes the spirit world, or Paradise, as being strewn with fragments of sards, jaspers, and emeralds, the only things left from the destruction of the world; and in his day they were considered the most valuable gems, as the *diamond and* ruby were not known in Europe until long after that age. In Pliny's time (xxxvii. 31) no precious stone was in so great favor as the chalcedony; and we find more intaglios and rare works of the ancient masters on it than on any other stone, which proves the high estimation in which it was held in that day. These valuable relics of ancient art have preserved their finest outlines for eighteen hundred years intact. M. Ben. Manser divides carnelian into six varieties, according to color and chemical composition. The difference between the sard and carnelian also sardonyx, is only in the latter always being in three layers, and the upper one red. The largest sardonyx known is that of the Carpegna cameo in the Vatican Palace, sixteen inches long and twelve inches deep. The subject is the "Triumph of Bacchus and Ceres," in a car drawn by centaurs. It consists of five layers, very thin. The next largest is thirteen inches by eleven, but far above all others in fame and historic value, called "Le Grand Camée de France," representing the triumph of Germanicus, where he is received by Tiberius and Livia, and the apotheosis of Augustus occupies the upper part of the scene.

Rabun County also contains rich gold mines, which, in early years, were worked out, so far as the deposits were concerned; but no efforts have been made to find the veins. This county is so mountainous that there is comparatively but a small portion capable of being cultivated or inhabited, but, from the great fertility of its mountains and valleys, must become a great centre for stock-raising, for milk and butter, cheese, wool-growing, and manufacturing, as the water power is equal to that of any country; and when the great through-line of road, or the Cincinnati and Charleston Railroad, with its branches, shall have been completed, so as to afford facilities for ready and cheap transportation, then Rabun County will occupy a high position in the scale of civilization and wealth.

Between Rabun and Habersham Counties are the justly celebrated Tallulah Falls, whose crystal waters rush onward over fall after fall, and rapids, and whirlpools for three miles, producing a series of charming scenes and landscapes, considered by travellers and visitors as being unequalled in grandeur and magnificence. In that short distance the water falls eight hundred feet, the greatest fall being one hundred feet. It was at this fall that the lamented and learned Hawthorne met his fate. In company with Judge Clayton and family, of Athens, he visited this romantic spot to feast on the sublime and soul-thrilling beauties of nature, which are here lavished by the Creator in rich profusion, suitable to the tastes of the poetic genius of the gifted orator. After they had visited and admired all the points of interest, the judge conducted the ladies to the camp, and returned to join his esteemed friend in a natural bath in the basin between *the two great* falls. But when he reached the place no one was visible. The clothes and watch suspended from a tree on the bank told the sad tale. The poet and divine was no more! He had plunged into the placid basin, and was swept by an unseen undercurrent to the bottom of the abyss, and held there by the jagged rocks.

The alarm was given, the inhabitants of the surrounding country were aroused, ropes were procured, grapples were made, and late in the night their lost friend was brought to the surface, and secured to a tree until the coffin arrived. Cruel oversight; for the extreme heat of the weather, and larcerated condition of the body caused it to swell so as to burst the cords before morning, and it was swept over the one hundred-feet fall, and plunged into the seething caldron below. Poor Hawthorne! Far below the falls his lifeless body was again found, wedged between two massive rocks, a bloated corpse. Additional ropes were procured from bedsteads of the peasantry; and by noon, one by one the men were lowered over the perpendicular cliffs, until enough had regained foothold on the treacherous shore to securely fasten the body of the man of God to the canvas sacking, and raise it to the plateau above, to be cared for by his heart-stricken friends. Then his deliverers were brought up as they had been let down, until all were safely landed on the mountain-top. Here the body was shrouded, and dressed in the habiliments of death, laid in its sarcophagus, and taken to town and interred with suitable ceremonies, where it sleeps the long sleep of death. He lost his life in consequence of his great love of the beauties of nature. He was a citizen of the chivalrous state of South Carolina, whose soul vibrated to every pulsation of humanity and charity, and commanded the unqualified respect and admiration of every true member of the church of Christ.

These falls are enclosed by rocky walls on each side of the stream, rising abruptly from one thousand to twelve hundred feet. The wild grandeur of the varied scene, the fury of the surging waters, the vast battlements towering high in air, the scream of the wild fowl, the fearful abyss, and the plunge of the mighty waters, produce the most indescribable sensations of sublimity, terror, and frenzy, which no time, space, or circumstance can erase.

Our esteemed friend, the young and joyous Hanks, of Clarkesville, with his companion Levy, now of Augusta, a few years before this sad event, came well nigh meeting the same fate at the same place. They were alone, seated on the incline of the crest of the great fall, admiring its grandeur and sublimity, when Hanks, giving way to his excited feelings in transports of joy, in an unguarded moment lost his foothold, and was precipitated over the fearful precipice feet foremost (Sam Patch like) one hundred feet into the *rushing waters of* the fathomless gulf below. Down,

down he went, until all consciousness was gone; and soon the maddened waters brought him to the surface, and threw his body against the cliffs, high above the water, and, by the merest accident or providence, he struck a fissure in the rock, and was wedged in so firmly as to remain there until consciousness returned. Then he found himself in a situation wholly incapable of explanation. He had no recollection of the preceding events; it was all a dream. There he remained for long, weary hours, which seemed years to the helpless, hopeless, dying man. But his terror-stricken friend, as if driven by instinct, ran three miles to the nearest hamlet, and alarmed the people to the danger and rescue of his friend. The beds were stripped of their cords, and they hurried back to the scene of suffering and death. Like lightning the news flew from house to house, and the naturally humane and tender-hearted people — men, women, and children — rushed to the spot, and offered their help. Several men were lowered over the cliffs, who were overjoyed to find their lost friend alive. A wild shout arose above the thundering noise of the surging waters, and told their friends above that Hanks was safe. A few minutes sufficed to tie a small rock to a cord and throw it to the sufferer, who caught the friendly missile, and drew the larger cord from the bank, and tied it firmly around his body. Now they gave a strong pull, and released him from his horrible prison, and in a few moments drew him, more dead than alive, to the shore, where he soon recovered. A few more moments and he was drawn up and safely landed on the plateau, where the whole country had collected to greet him, and contribute their mite to alleviate suffering humanity. Many years he lived to thank his deliverers for their labor and kindness. Hanks from this time was a changed man. The shock on his nervous system was so great that his whole physical and moral nature was changed, and, from a reckless pleasure-seeker, he became a sincere believer in the gospel of Christ, ignoring all his former follies and wickedness, and quietly yielding to the calls of Christian life. A few years after this event he sank under the wicked blow of the assassin, and passed from time to eternity.

Twelve miles south of Tallulah Falls are the beautiful falls, or rather cascade, of Tokoa, where the crystal stream falls over a vast ledge of itacolumite, or flexible sandstone, — the matrix of the diamond, — a fit emblem of the leap of this beautiful stream from the heights above down, down for one hundred and eighty-seven feet, into the deep basin below. It is more properly a cascade than a fall, and, at a distance, looks like a silver strand suspended from the skies. It is a lovely spot, where the most sacred and sublime poetic associations cluster around the heart of the lovers of nature, and elicit those sentiments of love and charity *which ennoble* the Adamic race, and prove them alone to be capable of appreciating the sublime and beautiful in nature, because created *after the image of God.*

Habersham County contains marble and vast quantities of iron ores, but few gold veins, none of which are now being worked. There are unmistakable evidences that at least four gold veins exist in this county, which, from the quality and character of the gold, are *true* or *fissure veins.* The form of crystallization of the gold is the same as at the Loud Mine, in White County, particularly at the Hughes Mine; but the Mathiss Mine, near Clarkesville, is of the same character with the Potosi Mine, in Hall County, and all of them fissure veins formed at a much more recent period than the sedimentary interstratified ones. The Loud Mine, the Nacoochee Mine (now being worked), and the Swift Island Mines, and Reid Mines, of North Carolina, yield gold of this character, some of the masses of which weighed from five to ten and twenty pounds; and one nugget, found at the Reid Mine, weighed thirty-seven pounds. These are all fissure veins, but those in Georgia are in the oldest sedimentary metamorphic rock, whereas those of North Carolina, of the same class, are millions of years younger, and formed by a distinct volcanic convulsion, being in the taconic formation, and yielding gold of a different quality. The surface or deposit mines of North-east Georgia have yielded about twenty million dollars,— now but partially worked for want of capital and of art, will soon be of immense value. All countries must have lime to keep up their agricultural status, or bring it, at a much higher price, from abroad, because it is indispensable to successful farming. Though very many never apply it, yet you will observe those same people, after years of exhaustive farming, sell out and go west to fresh land.

CHAPTER X.

Diamonds of Hall County. — Price. — Mode of Washing for them. — Cutting and Setting. — Emeralds. — Beryls, &c.

Running parallel with the marble is the immense ledge of itacolumite, or elastic sandstone, the matrix of the diamond. It extends throughout the county for thirty miles, and in every gold deposit, or branch mine near it, have been found splendid diamonds, by the gold-washers, who, being totally ignorant of their nature or value, either lost or destroyed most of them. Some were sent to Europe, to be cut and set in jewelry, but most of them were lost. Some are still in the hands of the finders, who keep them as mementos, in their rough state. Being entirely ignorant of their nature *or value, none* were picked up but such as were without *incrustation*, which, in Brazil and Golconda, amount to only the one tenth part of the whole product. Four fifths of all the diamonds found in any country are small, and only fit for mechanical purposes, in general being less than half a carat, or from one to two grains. The carat is a fraction less than four grains (three and one sixth), but in all estimates and sales in the mines the carat is put at four grains. It originated from the use of the seed of a plant in the East Indies, in the sale of diamonds. This berry, which grows only in that region, though not very accurate, answered the purposes of the semi-civilized Indians for several thousand years.

The yield in Brazil, for forty years, from the labor of from thirty thousand to sixty thousand hands, ranged between one thousand and twelve hundred ounces. Of this large amount they rarely found more than three or four, and never more than ten, that weighed more than thirty carats. These facts strongly confirm the opinion that, when developed, Hall County will be as rich in diamonds as Brazil, and contain even a larger per cent. of sizable ones of the first water. In washing for gold, all the large ones would, from the construction of the machines, necessarily be lost or thrown away with the quartz gravel with which they are associated, and only such as passed into the rifflers, with the grains of gold and fine sand, would be found in the pannings, after the day's work was done. All of those found in Hall County were thus found, weighing from two to six carats, some few less, and three were of large size. One of these, as before stated, was broken up, to see the cause of its lustre, by the ignorant miners. Another was used for years, by the boys, *as a middle man in playing marbles*, and the largest one by far was lost by Dr. Loyd, who was employed to oversee thirty negroes in working the Glade Gold Mine, a deposit twelve miles northeast of Gainesville. During the four years he was employed, he picked out of the sands of the pannings for gold every night, after the day's washing was over, about *half a pint of pretty stones*, which he gave to his wife, who put them in a mustard bottle in an old cupboard, except such as the children took a fancy to, which were generally lost. When the bottle was full, she made a little bag, and put them into that for future amusement. Some of these, from their size and reputed lustre, must have been worth from twenty thousand to fifty thousand dollars. But the "big one" was found by himself, whilst working in the pit, in place of a sick hand. He said that about *two hours by sun* (he had no watch), while raising gravel, he found a stone just like the little ones, except that it was *bright and shiny* only on one side, the other sides being covered with a crust of brown stuff. It was about the size of a "guinea egg." Being hard *pushed to* keep the wheelbarrows filled with gold gravel, so as to furnish grit for constant washing, he laid it on the bank, by a gum tree, which stood close by, until night, when he intended to take it up to the cabin, and give it to his wife and children, as being the largest of the *pretty stones* he had found. But when night came, the machines were emptied of their gold sand, and, in the hurry of the moment, he forgot all about the *pretty stone.* Twelve years afterwards he was shown a rough diamond, and at once recognized the contents of the "mustard bottle," and the "big one" he had laid up by the gum tree. Soon after he found the "big pretty stone," the lease expired, and the company who employed him sent home the hands, and quit work. About the same time Mrs. Loyd died; and his daughter, who had reached womanhood, married, and moved away to Northwestern Georgia, and took the little furniture they had, among which was the cupboard, which then contained the fated bag. When he became satisfied of the value of the stones, he at once left Atlanta, where he was keeping the Washington Hall, and went to his daughter; but she had no knowledge of the bag or mustard bottle. They were gone! He then went to the mine, and looked long and anxiously for the stone by the gum tree. No tree was there. The ground had been cleared and cultivated in corn for ten years. He looked in vain for any sign of the place. None existed. He *now washed* the gravel from the heaps where he thought it was, for weeks and months, but found it not. Discouraged and weary of hunting, he returned to Atlanta to die. From his description of its size and character, there can be no doubt of its being a diamond; and being, as he described it, about as large as a "guinea egg," must, if pure, have been worth about twenty-five million dollars.

The rule of lapidaries, for determining the value of perfect diamonds, is to square the weight in carats, and multiply the product by fifty dollars, the price of one carat, if weighing three carats and upwards to about thirty, at which weight the price is arbitrarily raised to four hundred dollars per carat; but if much under three carats, the price is rapidly lowered, and only commands ten dollars per carat; and the uncrystallized ones, used for pencils, for polishing, in time-pieces, and for engraving, are but seventy-five cents to one dollar per carat. All these laws of trade are, however, but little regarded now, and by no means to be depended on. We will, nevertheless, give you the rule which is said to govern the trade; but you may not believe they will be governed by it. A carat, for convenience, is allowed to be four grains. Thus, if you have a first-rate diamond of ten carats, it will be computed 10 × 10 = 100 × \$50 = \$5000; if one of one hundred carats, it will be 100 × 100 = 10,000 × \$400 = \$4,000,000, &c.

Queen Victoria owns the celebrated "Koo-i-noor" diamond, which was found three thousand and one years before Christ, or four thousand eight hundred and seventy-two years ago, and, when cut by Indian lapidaries, weighed only one hundred eighty-six and a half carats, which, if honestly cut, would have been worth thirty million dollars, but, by reason of taking off slabs as large as one hundred and thirty carets from the sides, or facets, they reduced this magnificent gem to one hundred and eighty-six and a half carats, valued at three million dollars, instead of thirty million dollars. The queen, not being satisfied with the Indian cut of it, had the stone recut by Amsterdam jewellers, who reduced it to one hundred and two and a half carats, and destroyed all of its great historical value and interest. So much for woman's waywardness. Yet she still values it at three million dollars, when, by the laws of trade, it is not worth the half of it. A rough diamond loses, generally, *one half* of its weight by cutting. This depends upon its form of crystallization, and its freedom from *flaws*, which are very common.

The Mogul diamond — the largest ever found — weighed seven hundred and eighty-seven carats. It was cut down, by dishonest workmen, to weigh only two hundred and eighty carats; and the *stolen slabs* cut off were worth far more than the stone. The true worth of the stone, by the rules of trade, was ninety-*three million* dollars, but, by dishonest means, it was *reduced to less* than four million dollars.

The price of the diamond is yearly advancing, in consequence of the production diminishing and the demand increasing. Several diamonds of the first water, found at the "Glade Mine," have been cut and set in Europe, and now worn by our citizens; yet, it is strange to say, no attempt has been made to wash for them with practical diamond miners. All the evidences concur in producing the conviction that the business would be a brilliant success with a very insignificant, and, I might add, contemptible outlay. "Like causes produce like results," and the vast ledge of flexible sandstone, which traverses the county for thirty miles, is of the same degree of metamorphism, or crystallization, as that of Brazil or Golconda, the Urals in Europe, and the same formation in Australia and Africa. It is only in the flexible sandstone that the diamond is found in any country, because the earth's temperature, when that rock received its present form of crystallization, was that necessary to crystallize carbon; and no diamonds are found except in this rock — its matrix. This peculiar rock was found only in Golconda for five thousand years; but in 1727, when a student from Portugal visited the Brazilian Gold Mines, for the purpose of collecting specimens for a mineral cabinet in Lisbon, after a few days' rambling through the mines, and the old workings, he unexpectedly found a diamond of immense value. He continued his examinations, and, in a few weeks, he found *four millions* of dollars worth of diamonds, which had been thrown away. He went home, and sent his brother back. But the suspicions of the crown officers were aroused, and he was arrested and confined in prison for a year. Despairing of release, he confessed his mission, and delivered up the diamonds, which were sent to the king, who pardoned him, and issued an order to his officers to rewash all the grounds for diamonds, which had been cast aside as valueless for seventy-five years. The rewashings yielded from one thousand to sixteen hundred ounces per year, worth infinitely more than the gold. In the last few years they are becoming exhausted. The mines last year only yielded one hundred and eighty-four ounces, with the labor of sixty thousand hands. This great falling off would have more than doubled the price of diamonds, but for the discovery of the South African and the Australian Diamond Mines, which are yielding fair profits.

The Golconda Mines, which have catered to the tastes of mankind for five thousand years, have become exhausted. No more aid to fashion or caprice can be expected from that time-honored place. It is done; and we must look to Georgia, Australia, and Africa, for future ornaments for the wants of fashion.

The Golconda Mines have been exhausted, or abandoned, for twenty years, after having been worked four *thousand* eight hundred and fifty-seven years. It is estimated by Mr. King, the queen's jeweller, in his late work on ancient gems, that the mines of Brazil have produced, in the last one hundred and forty years, *two tons* of diamonds, besides the vast number stolen. Professor Agassiz, of Boston, the prince of naturalists, was so fortunate, in his last visit to Brazil, as to procure *two* specimens *in the matrix*, which settles the long mooted question of their origin. It requires a certain temperature to crystallize any substance, each differing according to its density and capacity for conducting heat or electricity; and here God gives us the index, in this peculiar sandstone, or mother of the diamond, which was one of the first sediments, and deposited in a quiet deep sea-bed long before there was any animal or vegetable life on this globe. This formation, with the cotemporaneous strata, was upheaved by volcanic force, and changed from its former state to that of its present highly crystallized condition, which then liberated the carbon, and, by segregation and affinity, crystallized into the beautiful diamond, being in greater or less size in proportion to the amount of carbon within reach of its affinities, or power of attraction. What effect the same kind of volcanic heat, or irruption, would have upon the vast storehouse of carbon, in the great western coal-fields, is altogether hypothetical. If the cause should be of *the right temperature*, and continued long enough, the *amount of diamond* crystals would be immense, and no *longer sought* after by the fashionable.

The singular and beautiful cellular quartz is richly studded with crystals of the most perfect and splendid character, and so highly carbonized, that the powder serves as a polisher almost equal to corundum. It is the result of a fissure (from the hill of steatite) running at right angles to the strata, and passing through the elastic sandstone which partially crystallized it, and almost reduced it to pure carbon. It is in immense quantities, and indicates a large fissure. Several beautiful diamonds have been picked up near by in the branch gold washings, which renders it most probable they are abundant.

Largest and most celebrated Diamonds in the World.

1. King of Portugal,	1680	carats.	Size of hen's egg (a topaz).
2. Agrah,	645	"	(Tavernier).
3. Rajah of Mattan,	367	"	Found in 1787, uncut.
4. Nizams,	340	"	Golconda.
5. Great Mogul,	787½	"	Coulour (cut, 280).
6. Great Table,	282½	"	(Tavernier).
7. Regent,	410	"	Puteal, cut, 136½.
8. Orloff,	193	"	Cut as *a Rose.*
9. Star of the South,	254½	"	Brazil, 1853 — cut, 124.
10. Koh-i-noor,	186½	"	Ind'n cut, recut in 1852, 102½.
11. Grand Duke of Tuscany,	139½	"	(Austrian).
12. Shah,	95	"	(Russian).
13. Nassack, or Pigott,	89¾	"	Indian cut. Re-cut, 78 carats.
14. Dresden's Diam'd,	76½	"	(1860), from Brazil.
15. Eugenie's,	51	"	Brilliant, cut. French.

16. Pacha of Egypt,	40 carats.		Brilliant, cut.
17. Dutch,	36	“	Brilliant.
18. Hope's blue Diamond,	44⅛	“	Re-cut. France.
19. Polar Star,	40	“	
20. Treasury of Dresden,	81¼	“	(Emerald green).
21. Halphen's,	22½	“	(Rose colored).
22. Prince de la Riccia's,	15	“	(Rose colored).
23. Paul I.,	10	“	(Ruby colored).

24. Mawe saw three, of 215, 184, and 120 carats, rough, in Portugal.

The largest emerald known is the Devonshire, two inches in diameter, *uncut*. The largest sapphire, "*the wooden spoon seller's*," found in Bengal, one hundred and thirty-two and one sixteenth carats, sold to a French jeweller for thirty-four thousand dollars. Several diamonds have been found in South Africa lately, worth from one hundred dollars to fifteen thousand dollars, and a few of greater value. Much excitement prevails now, and many are preparing to go to Africa from England and America to wash for them.

The diamond was not known to the Greeks and Romans until the Augustan age. The "adamantine chains" in Æschylus, pictures of Prometheus Bound, and his iron finger-ring, prove the *adamas* of the early Greeks and Romans to have been nothing but hardened steel. Theophrastus, in his book on gems, does not mention the diamond at all. The first mention of it is by Manilius (iv. 926): —

"*Sic adamas*, punctum, lepidis, pretiosior auro."

and struck with a hammer, instead of breaking, is driven into the anvil! This assertion has caused the loss of millions of dollars, in Georgia, by misleading the ignorant, and causing the destruction of two splendid diamonds, as they are as easily broken as a piece of glass. The diamond is crystallized in thin layers, which are cleavable parallel to the planes of the octohedron, which was discovered by De Boot, in 1609, but disbelieved, but again discovered by Dr. Wollaston. The use of the diamond splinters, set in iron handles, which is of modern origin, is certainly a mistranslation of the Vulgate (Jer. chap. xvii. ver. 1), for the Babylonians, Egyptians, and Jews had no knowledge of this stone in the time of Jeremiah, or the reign of King Solomon. It was the corundum from Babylon and Naxos that the gem engravers used until the fourteenth century. The use of *diamond dust*, or the inferior stones reduced to powder, to cut and polish others, was not discovered till 1475, by Louis de Berquem, which enables the lapidary to give a much cheaper and better polish and cut than by the old method, as that only enabled the artist to polish the *natural facets*; but this new discovery enables him to *form new facets*, and greatly increase its brilliancy. Very lately the European and American lapidaries use the "carbonado"—a black, uncrystallized carbon from Brazil, which occurs in large masses, like iron or manganese, which have all been thrown away for one hundred and forty-three years as valueless, but is now worth seventy-five cents per carat for polishing and cutting the costly ones. The discovery has caused the miners to commence a re-washing of all the gravel, which will require the labor of at least fifty thousand hands, for a century to come, to exhaust the supply, and in doing which they will find at least one hundred ounces of pure ones annually, which have been thrown away by careless washing, or liberated by the decomposition of the matrix.

The diamond is held by the Persians as second to the emerald, and third from the ruby; but in India it always has claimed precedence, from the remotest antiquity. Diamonds of the "old rock," which, for thousands of years, bore the highest price, are nothing different from others, only in being *without incrustation*, caused, most probably, by recent decomposition of the matrix. It was the opinion of the ancients, that the deeper you dug into the bowels of the earth, the more and purer were the diamonds. But all geological, chemical, and mineralogical developments prove the theory to be false, because no diamonds could exist, or be formed, until the volcanic upheaval of the earth's crust, with its superincumbent primary sediments, among which were the flexible sandstone strata, with their carbonaceous matter, *which, by this* peculiar plutonic degree of heat, cryswhich proves the above assertion, that no one, previous to that age, except kings, either owned or knew of the diamond. Pliny is the first author that gives a correct account of this precious gem, agreeing with Plato's notion, in his Timeus (59 B.), where he gives the origin of metals by infiltration and condensation, by which the highest form of crystallization made gold, and by further infiltration and heat the germ was left in the form of the diamond. This theory, for that age, was far beyond our expectations.

The diamond is the hardest of all substances, and consequently could not be cut by the ancients; they could only polish the natural facets, which are covered with an incrustation of the oxides of such metals as abound in close proximity, and in some cases the most abundant associate mineral is carbonate of lime, or marble, which gives, by its decomposition, an incrustation which, with the oxides of iron or manganese, or both, completely disguises the lustre of the gem, and makes it necessary to detect it alone by its form of crystallization. They only used the perfect octohedral crystals, which were free from those adventitious coatings which destroy the lustre of four fifths of all found. Those were called, by the diamond merchant, "naifes," and diamonds of the *old rock.* Being ignorant of geology, they supposed that they were found deep in the ground, to be pure; but the quantity, as well as *quality*, of diamonds is by no means governed by the *position* of the rock. The matrix of this precious gem is the itacolumite, or flexible sandstone, a sedimentary rock which has become highly crystalline, by volcanic heat, when the earth's crust or mountain chains were upheaved, and that temperature and electric affinity crystallized the carbon in the rock, and gave us the diamond. It is impossible for this to obtain in any formation, except the primary non-fossiliferous rocks, as no other epoch contained both the elements and temperature necessary to form a crystal of *carbon*. The Romans never knew or obtained any above three carats; by reason of a stringent law in India prohibiting any above three carats being sold or exported. All above ten carats reverted to the crown, as a royalty to the king, under heavy penalties.

Pliny mentions the *cubic* form of the diamond, and the "cenchros," which he describes as like unto a millet seed, and an abnormal form of crystallization, which cannot be polished, and only used for powder and splinters for engraving. It is called "bort" in the trade, which signifies "bastard." M. Ben. Mansur, though good authority on ancient gems, shows his prejudice of early education by asserting that the diamond was so hard that one laid on an anvil, discoveries in the art of cutting and polishing, can cut and polish a diamond in half the time required by European artists, and decidedly superior in point of elegance, and possessing all the powers of refraction and reflection the stone is capable of; the consequence of which is, that many gentlemen and ladies of Europe have had their stones recut with great satisfaction. American ladies have the same unbounded confidence in Morse's superior skill, and many have already had their sets recut. The discovery of the brilliant cut was in the reign of George I. It consists of two cones united at the base, the upper deeply truncated, with thirty-two facets between the table and girdle, and twenty-four below the girdle. Small diamonds lose from thirty to forty per cent., and large ones from fifty to sixty.

Georgia is destined to furnish a large portion of the demands of fashion for ages to come with these brilliant ornaments. Hall County also yields the zircon, amethyst, topaz, and beryl, all of poor quality; but the chemical constituents of the beryl being the same, or nearly so, of the emerald, leads us to believe that that gem may be found here at some future day.*

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* The emerald (the smaragdus of Pliny) is said by Deutens (p. 36), K. O. Miller (Archæology, 312, 2), and other high authority, not to have been known to the ancients. They only knew the prasse, and other green gems, which were so plentiful in Europe and Asia; but this certainly is an error, for the Iron *Crown of Lombardy* is studded with emeralds, and was pre-

On the lands of Mr. Roberts, fourteen miles southwest of Gainesville, the beryl is found, and the indications are good to find the emerald. The formation is the same as that at the factory, four miles below Athens, on the west bank of the Oconee, where some splendid beryls have been found. It and the ruby, by the caprice of fashion, have of late years assumed a higher value than the diamond; but this is only transient, as the nature and characteristics of the diamond will give it precedence forever. The process of washing for the diamond is very simple, cheap, and within

sented to the Cathedral of Monza by Queen Theodelinda, at the end of the sixth century, nine hundred years before Peru furnished Europe with that priceless gem. In several collections in Europe are emeralds once owned by Tiberius, Augustus, and Constantine.

The emerald is composed of

Glucina	12.50	15.50
Silica	68.50	66.45
Alumina	15.75	16.75
Oxide of chrome	0.30	0.00
Oxide of iron	1.00	0.60
Lime	0.25	0.00

The native form of the emerald is a hexagonal prism, terminated by six-sided pyramids. Specific gravity, 2.75; hardness, 7.5 to 8; color, splendid green. Always found in primitive rock, generally in hornblendic gneiss, fissured by volcanic force, and the gems embedded in that or magnesian limestone, or greenstone. Judge Peck reported he had found one in the Iron, or Smoky Mountain range, in East Tennessee, not far from Greenville. But the formation of that locality is not such as to give any strength to the story. It must have been what the Greeks called chalcedon, a kind of silicate of copper, used *as a precious stone* in early ages.

tallized the rock or matrix, and at the same time the carbon was, by chemical affinity, concentrated, and received its present form of perfect or abnormal shapes or forms, as that of the "bort" or bastard diamonds, or the "carbonado" of the present workings of the Brazilian mines, and the perfect crystals. The Koh-i-noor, which was found three thousand and one years B. C., came into the possession of the Queen of England by the late conquest of the Punjaub, in India. It was covered with facets, curiously arranged around its circumference, encircling the base of a depressed four-sided pyramid. It weighed one hundred and eighty-six and a half carats, after being cut by the Indian lapidaries, but must have weighed, in the rough, at least six hundred or seven hundred carats, as one *slab*, cut off to form a facet, was captured in Persia, by Tamerlane, weighing one hundred and thirty-two carats. This time-honored gem, if honestly cut, would have rated at thirty-five or forty millions of dollars; but when captured with the crown jewels, in the Punjaub war, it only weighed one hundred and eight-six and a half carats, which, by the foolish caprice of Victoria, was recut, a few years ago, by imported Amsterdam Dutch diamond cutters, who adapted the figure or design to their crude notions of taste, and thereby reduced it to one hundred and two and a half carats, and destroyed not only its great historical value, but its lustre. They charged her forty thousand dollars for this *misdemeanor*, besides the "chips," or slabs cut off.

The Orloff diamond of Russia weighs one hundred and ninety-three carats — cut. The Nizams weighs three hundred and forty carats, is almond-shaped, and was broken in two pieces during the Punjaub mutiny. That of the Rajah of Mattan is said to be the finest one now known, weighing three hundred and sixty-seven carats; it is egg-shaped. The Regent of France, of four hundred and ten carats in the rough, and cost only seventy thousand dollars, occupied two years in cutting it, at a cost of twenty-five thousand dollars. It now weighs one hundred and thirty-six and seven eighth carats, and is the most perfect and splendid diamond in the world. It was found in the mines of Golconda, in India. The diamond is electric and phosphorescent only when highly heated in the sun's rays by a powerful lens, and then the effect is only transient. The celebrated Sancy diamond, from its peculiar form and numerous facets, is now proved to have been Indian cut. The modern rose cut contains twenty-four facets, while the brilliant contains thirty-two, and much deeper. In Amsterdam the number of diamond-cutters is about ten thousand; comparatively few in Berlin, Paris, and London, and but one house in the United States, of twelve persons, carried on by Crosby, Morse, & Foss, of Boston, Mass., who, *by superior* machinery and knowledge from new healthy climates in the world, where every law of nature tends to the highest development of both the physical and mental powers of man, and where his enjoyments may reach their fullest perfection and anticipations. We omitted to state that the monazite and rutile are found here, as additional accompaniments of the diamond.

The fragments of this beautiful as well as useful mineral, the cellular quartz, are in immense quantities, striking at right angles to the strata, and originating from large outbursts of steatite, which proves the vein to be plutonic, and all the sediments of gold and other metals confirm it.

Near Gainesville mica has been found of such quality and quantity that hopes are entertained of its being valuable in supplying the demands which have been but recently created by new discoveries in the arts, greatly enhancing its price. Heretofore all our supplies came from France, Russia, and New Hampshire; but from recent explorations in the South, some valuable localities have been discovered in Western North Carolina and North Georgia, which will most probably release us from dependence on foreign countries for a supply. In addition to the above, this section yields talc (pyrophyllite), white marble, plumbago, asbestos, kaolin, and copper, the flexible sandstone for building and lining furnaces, steatite, or soapstone, *granite, and felspar*, hornblende, micaceous and talcose slates, and quartz, with timber equal to any county in North Georgia, which is now being manufactured into carriages, buggies, wagons, &c., which have obtained an extended celebrity, in consequence of their unequalled durability. This fact has been satisfactorily established in the last twelve years, and secures to this section a monopoly in that particular kind of carriages, cars, and wagons, predicated on practical knowledge, economy, and ability.

Lumpkin County has produced more gold than any other county in the state, in consequence of the peculiar configuration of the mineral belt, causing the more extended decomposition of the auriferous veins, which here have been broken down from three hundred to six hundred feet, whilst in many of the adjoining counties the depth of the gulches, or ravines, and valleys, does not exceed two hundred feet; though traversed by veins equally rich, the deposits are comparatively poor. This is more fully illustrated in California, where the ravines, or cañons, as the Spanish term them, are from one thousand to two thousand feet deep, which gave such enormous yield to the miner; but when he opened veins which made the deposits, he was astonished to find the ore worth only eight, ten, and fifteen dollars per ton. The mines in Lumpkin County have mostly been discontinued, in consequence of the war. The Yahoola Company, of Bos*ton, Mass., is* being worked on a very moderate scale, the power of the poorest citizen. The gravel and sand from the bottom of the alluvium of the streams is placed under a fall of water, or in a trough with a stream of water running through it, where it is reduced to one twentieth of its bulk by stirring, and the action of the water, by which the particles of iron, gold, platinum, and diamond are easily separated from the quartz by their greater density. It now is passed through sieves on inclined planes, over which clear water flows (in the sunshine the best), and the diamonds are picked out of the sand by persons familiar with their appearance, or form of crystallization. Some use a waterfall of two feet into a box or tub, and reduce it in that way, and then place the prepared sand in the sunshine in clear water, where they are detected. It is a very slow and tedious process, and requires that the operator either possess a goodly share of moral principle, or he must be a slave, subject to the will of a master. All kinds of devices are used — bribes are offered to stimulate them to industry and honesty on the one hand, and threats of severe punishment on the other; and yet, in despite of every precaution, the work is generally badly done. General listlessness and inattention prevail, and when large diamonds are found, most of them are stolen, and sold for a trifle, compared with their value. In that class of people in the Brazilian mines there is no such thing as *moral principle*, and *your success* depends mainly upon the watchful care of the overseer. The business in this county would be much more profitable, from the immeasurable difference of the labor which could be procured by paying remunerative prices. This will be done, and the result will be most satisfactory.

CHAPTER XI.

MICA IN HALL COUNTY AND WESTERN NORTH CAROLINA. — MARBLE. — SOAPSTONE. — CELLULAR QUARTZ NEARLY EQUAL TO CORUNDUM. — ZIRCON, MONAZITE, RUTILE, GOLD, SILVER, LEAD, IRON. — LUMPKIN COUNTY GOLD MINES. — HYDRAULIC WORKS. — CHESTATEE RIVER. — BOLY FIELDS VEIN. — TETRADRYITE. — HARRISITE. — AMETHYST. — TOPAZ.

THE altitude of the plateau on which Hall County is situated varies from twelve to fifteen hundred feet, and about thirty miles south of the mountains, though immediately on the top of the grand central axis of the Blue Ridge, which here sinks beneath the stratified first sediment, or, in other words, the mountain or granite never reached the surface, except a few detached points. It lies between thirty-four degrees and thirty-four, twenty-one minutes, giving it, with its *neighboring* counties, one of the most delightful and

In the Canton Copper Mine is found a new mineral, by Professor C. U. Shepard, called "Harrisite," from the owner of the mine, who was killed at Baker's Creek. It contains cu. 78, sul. 22, accompanied with galena, automolite, chalcopyrite, and free gold, in micaceous slate. The gold ore in the *Field's Mine*, is immensely rich, but the vein is only two to four inches in thickness, opened to the depth of twelve feet, when a lawsuit put a stop to all further developments.

Copper abounds in Lumpkin County, of good quality, and thought to be in inexhaustible quantities. The veins, being from five to fifteen feet thick, and five thousand dollars having been expended on one, south of the river, developed facts of great importance; yet the openings were all stopped for want of funds, and it lies in that condition. The mines of this county, of Union and Fannin, are, unquestionably, of the first character. The mineral springs are becoming noted for their curative properties, among which are the Porter Springs, twelve miles north-east of Dahlonega, much resorted to in summer, and give general satisfaction to all who frequent them, except consumptives, who soon sink under the influence of the water. It is composed mainly of iron, some magnesia, and a little lime.

The Siloam Springs, north-west of the town, are just being opened, and, as yet, but little known.

The water is chalybeate, with a small per cent. of soda.

Another of equal value, though altogether neglected, is within half a mile of the county site, and one of the most valuable chalybeate springs in the state.

It is now believed that the through line direct railroad from Cincinnati or Louisville to Macon and Savannah, or Brunswick, will soon be built, and traverse Lumpkin County, and give all the needed facilities for developing that rich country. The United States Branch Mint was situated in Dahlonega, in this county, but has not yet been resumed since the war, and most probably never will be, as the policy of the government has been changed since that time, giving to the inferior mining districts *assay offices* instead of mints. The great and rapid transportation and travel on the many railroads now render it unnecessary, and the expense being much lessened, and the benefits to the miner the same, it makes but little difference.

Lumpkin County has produced the largest and most valuable topaz yet found in the United States — from the gold washings of the Etowah River, above Palmer's mills. It weighed about two pounds, and was sold by a little boy for ten cents, sent to Philadelphia, and sawed in two, and half of it made into jewelry, and the other is now held by Mrs. Colonel Varnum, of Talbot *County. Lumpkin* has also produced amethysts, rock-merely to keep the machinery in order. Their hydraulic works cost nearly half a million dollars, and bring the river from the mountains for twenty miles, and cross the river valley by large cast-iron pipes to the plateau near Dahlonega, from whence, southward and southwestward, they propose to wash off several thousand acres after the California process, by doing which they necessarily must find hundreds of rich veins of gold quartz, which, in California, yielded such sudden fortunes to those bold adventurers, who, in some instances, canalled the streams thirty, forty, and fifty miles.

It is in this county that the great Fluming Company began to canal the Chestatee River for twenty miles, or, rather, conduct it for that distance, in a wooden flume, or aqueduct, so as to work its bed for deposit gold after the California process; but before the preliminary arrangements were completed the company failed, and years will be required to reorganize. The river bed, wherever it could be washed, was immensely rich, frequently yielding one hundred dollars to each ten feet square. About four millions have been obtained from the shoals, and such places as could be *dammed out* cheaply; but all the deep water, comprising two thirds of the river bed for twenty miles, has not been touched. This company have acted upon the "fancy stock" plan, and are satisfied with the few thousands paid in, and suffer the magnificent project to fall through for that contemptible sum, when, if carried out, it would yield at least six millions, and amply pay, not only the stockholders, but the more active agents, who generally get the lion's share. From the *Boly Fields Vein*, in the Chestatee River, is found the rare and beautiful *tetradymite*, from a gold vein, in hornblendic gneiss, and when first examined by Dr. Jackson, of Boston, pronounced to be *bornite*, which, from subsequent analyses, he corrected. Tellurium ores are found at White Hall, Va., and in Cabarras County, N. C., but were not found or noticed in California, until Professor W. P. Blake's visit to that country, when he found it in Eldorado County, near Georgetown, and the Melone Mines, which also produced *melonite* — a new mineral, resembling the former, and at first thought to be molybdenum. It has a specific gravity of 9.3, and is composed of au. 24.80; ag. 40.60; te. 35. The telluret of the Field's Mine is foliated, and contains au. 60, ag. 28, te. 12, and is found in hornblendic gneiss, alternating with micaceous and talcose slates. In some specimens from the Field's Mine, the gold amounted to ninety per cent. of the mass.

The tellurium ores of the Stanislaus Mine Co. occur in talcose and chloritic slates, associated with quartz, apatite, uranium, titaniferous iron pyrites, chalcopyrite, galena, blend, and free gold; in Rowan and Cabarras Counties, N. C., in argillite slate.

Floyd County, on the south, between the Etowah and Oostanallee Rivers mostly, is one of the richest counties in the state for grain, cotton, fruits, and potatoes, with the grape culture just emerging from nothing, and assuming a favorable aspect. She has a population of seventeen thousand, and Rome, her chief city, has four thousand inhabitants — rapidly improving, and must soon become a commanding place of trade and manufactures, and be a kind of "Pittsburg" of Georgia in iron, coal, hardware, machinery, agricultural implements, and also the fine arts. All these should occupy her attention, or less favored localities will wrest it from her, as Baltimore has stripped the laurels from the brows of Norfolk, and left her distanced in the race for *progress.* The people of Rome are enterprising, industrious, and determined, with a large spice of religious and moral character, together with a high degree of hospitality; all they need is a leader, a master mind to project, and means to carry out his projects, and Rome would soon rise into power and wealth equal to any of our southern cities.

CHAPTER XII.

North-west Georgia. — Climate. — Altitude. — Coal and Iron Mountains. — Valleys and Rivers. — Nickajack Cave. — Slates.

It is reserved for Dade, Chattooga, and Walker to furnish the chief part of the coal and iron, to give tone and permanent stability to the manufacturing interests of all the other counties. In fact, coal and iron constitute the "backbone and sinew" of the industrial wealth of any people or nation, and without which any community will cease to keep pace with the civilization of the age.

The north-west angle of Georgia is on the Tennessee River, at Nickajack, a celebrated cave, and creek issuing from it, in latitude 35° north, and longitude 34° 53′ 38″ west of Greenwich, or 7° 39′ 26″ west of Washington city. In the cave are extensive nitre beds for two miles, and the guano, from the droppings of millions of bats, is of great value. And in this range of mountains are thousands of caves containing more or less of these phosphates, for the farmer's use.

In addition to coal and iron, these counties contain crystal, and cyanite. In Forsyth are found rich veins of gold, and, in one locality, of amethysts of superior quality.*

In Clarke County, the seat of the state university, are found the beryl, gold, plumbago, iron, granite, gneiss, and endless water power, which has been partially improved by the erection of cotton and woollen factories, flouring mills, &c., with enough left to drive one hundred thousand more spindles, and other factories to correspond, to which is added a climate not surpassed by any on earth. A very great inducement to settle in that section are the additional advantages of society and education. No place can outvie Athens in her determined purpose to equal any community in literature, the fine arts, and all other acquisitions that tend to elevate the human race in the scale of being, and ennoble the immortal soul with the necessary acquisitions to render it happy and progressive through all eternity. In Jackson, Banks, Franklin, and Elbert, there are but few of the precious metals; but iron and copper abound, with beautiful prismatic quartz crystals suitable for microscope glasses. In Cherokee, Cobb, Paulding, and Polk you find gold, iron, lime, galena, and immense quantities of roofing slate, which is now being worked on a large scale and paying a good profit. The water power in Cobb and the other counties is equal to the wants of any company, and a soil that is not surpassed produces every variety of fruit and grain in the greatest profusion. Pickens has, in addition to these, immense quarries of statuary marble. Whitfield and Murray have gold, iron, pictorial marble, and some coal. The marble is of superior quality, and sulphate of barytes will enable some unprincipled scoundrel to adulterate paints, &c., so as to make a living off his honest neighbors.

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* Amethyst is nothing but rock-crystal colored purple by oxide of iron and manganese; but the true Oriental amethyst is a species of corundum or *purple sapphire.*

The common German and American amethysts were highly prized a century ago. That beautiful necklace of Queen Charlotte was valued at ten thousand dollars: now it would not bring five hundred dollars. No country on the globe produces such vast quantities of amethysts and topaz as Hungary, Bohemia, and America. Also many are found in Ireland, where one crystal was found which weighed one hundred and forty pounds! This beautiful gem is now coming into favor again, and will in a *few years* attain its former rank in the scale of cheap gems.

Dalton, in Whitfield, is the great railroad centre of North-west Georgia, and, from her proximity to the coal districts of Georgia and Tennessee, must become a large manufacturing and distributing depot. It is situated in a beautiful and very fertile and healthy country and climate, with an enterprising population, whose only fault is a too great love for money at the expense of more noble acquisitions, which, however, is gradually giving way to a better feeling and a higher aim.

cessfully with those of any country in its manufacture.

England and Pennsylvania owe all their greatness and wealth to their coal and iron mines, and manufactures connected with them. Why should not Georgia at once free herself from the shackles of slavery, and dependence upon foreign labor, for an article she can manufacture cheaper and better than she can get from abroad? She will and must change her policy, and then she will reap the reward due to her industry and wisdom. It is for the means, the help to do this, that she calls so earnestly and so loudly for population and capital.

It has been for many years, and even yet is, argued by thousands, that Pennsylvania must always hold a monopoly in the manufacture of iron, in consequence of her anthracite coal. This is altogether unfounded, for no country on earth manufactures iron so cheap as England from bituminous coal. It is not the quality of the coal so much as its proximity to the iron beds, and the quality of the iron ore, with the limestone, firestone, and cheapness of living. The manufacturer of Georgia has far greater resources of iron ore, of better quality than that of Pennsylvania, and altogether inexhaustible, and in immediate contact with the coal, which is equal to the wants of trade for thousands of years. This coal, by coking, can be made equally available with anthracite, and, without fear of successful contradiction, we would say that it will make as good iron as charcoal or anthracite. In addition to this, the products of distillation of the coal will more than pay the expenses. Consequently Georgia, with her superior coal, water power, timber, fine climate, and market at home, with cheap living, can forever make iron cheaper than Pennsylvania by at least eight to ten dollars per ton. She has the hematite (magnetic and specular oxide), black band, and other ores, not only in the carboniferous and silurian formation, but in unmeasured quantities in the primary non-fossiliferous regions. Everywhere surrounded by a rich agricultural country, and one where manufacturing must soon obtain, in consequence of the unlimited cheap water power, and the demands of society; rivers and railroads now built, for navigation and cheap transportation, without winter, ice, or snow; the cost of living much cheaper than in the old countries, — all conspire to show that Georgia must, at an early day, enjoy the monopoly in iron manufactures, provided she invest the necessary capital to develop her magnificent resources. This is theory. Now we will apply the facts to substantiate our position.

First we will cite the reader to the extensive furnaces of Cumberland River, in the coterminous State of Tennessee, and then those of North-west Georgia, where they have been shipping both blooms from the *forges, and pigs* from the furnaces, for years, amount-lead, limestone, and the highest grade of agricultural products. The great coal-field is mainly confined to Dade, Walker, and Chattooga Counties, which embrace the eastern terminus of the coal-seams in the Lookout and Pigeon Mountains. East of this there is an abrupt escarpment, where the great western carboniferous group has been folded over in its upheaval, and the eastern section, in Whitfield, Catoosa, and Floyd, and part of Walker, subsequently carried off or destroyed by abrasion, being only the thinned edges of the deposit in the ancient sea-bed. These detached portions, on the ridges and elevated plateaus, are the only remains of a once continuous seam.

This view of the subject is strengthened, and, in fact, proved by the existence of the layer of black slate, which shows itself in the deep valleys and gulches in those counties; also in the same situations throughout West and Middle Tennessee, Alabama, and east of the Unaka Mountains, in North Carolina. This black slate stratum *underlies* the coal-measures, and is more or less bituminous from the infiltration of the petroleum from the coal-measures.

These facts should be a caution to miners and prospectors, who are hunting for coal in this region, where they frequently find what are called, by miners, "false coal-seams," which sometimes yield, for a while, good profits, but invariably lead the miner to ruin. From the nature of their formation, no reliance can be placed in the results. In the Middle and Eastern States, millions of dollars have been expended in hunting for coal where it was impossible to be found. In the silurian, taconic, and plutonic formations, it is impossible to find coal, except in very thin seams in the first group, because, when they were formed, there was no vegetation on earth to make coal. "The effect cannot exist without the cause." Attention to this one fact would save millions annually of money, and many heart-rending disappointments.

At this time explorations are being made for coal in Hall County, composed altogether of plutonic and metamorphic rock! The extreme north-western angle of the state constitutes a part of the great carboniferous system of North America, which is the largest coal-field in the world, amounting to more than two hundred and forty thousand square miles. Of this immense amount, Georgia claims only about two hundred and fifty or three hundred square miles, which is estimated, by distinguished authority, to average from ten to twelve millions of tons per square mile. This estimate would give an amount of coal to our people which should make them to be perfectly easy, on the score of future supplies, for the next thousand years. The country, bordering on the coal region for one hundred miles, is an inexhaustible field of iron ore of the best quality, which, being in close proximity to *the coal, will enable* the manufacturer to compete suc-

The Polk County slate quarries are soon to be brought into communication with the outside world, by the completion of the Van Wert and Cartersville Railroad, which will give a new impetus to the works, and afford those facilities which inure to the benefit of the operators, by giving cheap transportation to their trade. Nearly all the profits heretofore were swallowed up by the slow and costly freight of wagon trains.

We now look forward to an early rise in the market, and the embarkation of larger capital in so indispensable a branch of architectural industry.

With an additional population of a million, and a capital of thirty million dollars, Georgia can rise above the servile dependence she has been cursed with during the last century, and in twenty years more become the richest and most powerful state in the South. We agree fully with the Rev. C. W. Howard, in his opinion and views, set forth in his able report, of the mineral and agricultural resources of North-west Georgia, recently, except his estimate of the extent and quantity of coal, which we conceive to exceed his calculations by at least one hundred per cent.; but in iron, fire-clay, timber, lime, water power, and agricultural resources, we fully agree.

The soil in North-west Georgia is justly celebrated for its fertility, being made from the decomposition of limestones and shales of the carboniferous rocks. It will continue to produce abundantly for many years, with but little addition. That whole section is well situated and healthy, though fevers do prevail, during some wet seasons, along the rich alluvial valleys and sluggish streams. The water power is by no means equal to that of North-east Georgia, or even Middle Georgia, yet it is sufficient for more than ten times the present population. The streams that water this section run into the Tennessee and the Coosa Rivers. The altitude of the valleys and plains is about seven hundred feet, and the ridges and mountains twelve hundred to two thousand feet. A part of this rich region is composed of silurian rock, but the extreme north-western angle is carboniferous, and extends farther eastward than geologists have heretofore believed. The peculiar folding over of the carboniferous series of strata, including the coal, from the taconic system to the Lookout Mountain, and their subsequent abrasion, leaves but limited, detached coal-beds throughout all that region, from Floyd to East Tennessee, generally not of sufficient thickness to be worked profitably. Such are called "false coal-measures." The superficial rocks and minerals found from Allatoona to the Chattogatta ridge of hills, belong to the Potsdam sandstone group of New York, and from thence to the Lookout Mountain the Portage and Helderberg prevail, corresponding with the Wenlock and *Devonian in England.* In this formation is found ing to millions of tons, to Pittsburg, Philadelphia, and New York, where it sells for five to seven dollars per ton profit, over the Pennsylvania and New York manufacture; where they work it into stoves, axes, all kinds of agricultural implements, steam engines, &c. If they can make a profit now on it, by shipping it five hundred to one thousand miles, and selling it in its crude state, with high freights, commissions, and every other adventitious expense, what will they make to manufacture the iron into all those different forms, and reap the increased profits accruing from manufactures? The profit from converting iron into steel is very important, and that of converting it into machinery much more so, and that of converting them into domestic articles and agricultural implements thrice as great.

No European or northern manufacturer, with means, but will soon see the large profits awaiting investment; which they will embrace as soon as they become satisfied they can live here without being subject to chills and fevers, and can have a market, &c. All these mooted questions will soon be settled, and capital will flow where it pays best. Georgia has an insuperable advantage over Pennsylvania and the North-west by reason of the proximity of her iron, and coal, and water power, which, with fire clay, fire stone, timber, food, hay, and all kinds of fruits and cereals, give her an advantage which no other state or nation *possesses* in the world, and, in twenty years more, will become a fixed fact, while the pioneers in manufacturing during this period will be the only recipients of the benefits of the solution of this great problem in political economy.

We must not pass unnoticed the valuable slate quarries of Polk County, which are being now worked to great profit, and bid fair to outrival any quarries elsewhere in quantity, as well as quality, of slates. Professor C. U. Shepard has examined and reported on them in the most flattering manner, and his opinion is law in mineralogy. This additional mineral, so useful in the arts, adds another source of wealth and independence to our already favored people, which they should at once appreciate by prompt and suitable appropriations for the development of our other resources, so that each department of industry may reciprocate, and aid the others by mutual patronage and aid to home industry. All the people ask is legislative help to make a geological survey of the state, that they may know where to invest their capital; and its results will stimulate a full appreciation of this important object. They do not ask this as a favor, but demand it as a right, to which all free men are entitled who pay taxes to support a government, and as the members of the legislature are elected by the people *to represent* their sentiments, interests, and wishes, *and are servants* of the people, required to do their *bidding.*

on the road to Pickens from Canton (about half way), which is not known to the public. It contains iron, magnesia, and lime. But Hall County will soon become the great centre of resort for health, when the Air Line Railroad shall have been completed, because she claims to be entitled to the appellation of the "Saratoga of the South," in consequence of the different kinds of water, the pre-eminent salubrity of its climate, and its magnificent scenery. When all these extrinsic advantages are combined with easy, rapid, and comfortable railroad travel and transportation, with its handmaid the telegraph, then she will take her stand at once as a first-class watering-place, and in a decade of years the country around will be embellished with all the appliances of wealth and fashion as the summer resort of the rich epicure and invalid of the lowlands and coast-line, as well as the dashing seekers after pleasure and display. The medicinal qualities of these springs are unquestionable, and long celebrated. The "sulphur," six miles north-east of Gainesville, on the line of the railroad, is wonderful in its curative effects in all diseases where the nervous system is involved. The lime and magnesian spring, two miles from town, is one of the finest in Georgia, affording a large stream of cold, pure water from a mountain of white marble, or carbonate of lime, with other minerals. The chalybeate spring is one mile south of town, and, for its tonic properties, is equal to any of the kind. The climate, particularly in summer, is delightful beyond description. All visitors agree in this, without regard to their complaints. When night comes, and calls for "nature's sweet restorer, balmy sleep," there is no disappointment. The body is refreshed, and the mind strengthened and prepared for the duties of coming time, and all things are in harmony and peace.

Near Clarkesville, in Habersham County, on the lands of Colonel McMillan, is a valuable mineral spring, but, never having been analyzed, is only judged of by its curative properties. At Nacoochee, in White County, is a chalybeate spring of very good quality.

The sulphur spring at Trenton, in Dade County, is one of the most valuable in the state, and, being on the Chattanooga and Alabama Railroads, is easily accessible, and not only contains sulphur, but lime and magnesia.

The sulphur springs in Butts County, long known as the Indian Springs, have been frequented for half a century by thousands, who all testify to their superior medicinal qualities. This county runs several thousand spindles in cotton manufacture, on the Oakmulgee River, where the water power is immense.

The yield of the valley lands generally is from twenty to thirty bushels of corn per acre, and from twelve to fifteen bushels of wheat, except North-west Georgia, which yields ten to twenty per cent. more;

anhydrous limestone, which indicates gypsum and rock salt; but from the absence of all the saliferous underlying strata, and the highly inclined and closely proximate silurian and taconic rocks, no well-grounded hope can be entertained that either will be found in that section. The dip of the strata is nearly, and in some places quite, vertical to the metamorphic rock of Allatoona. The abundant remains of favosites, crinoidea, &c., prove conclusively that long before the carboniferous period, extensive coral reefs or plantations existed in that sea.

It behooves the miner and prospector for coal to look well to the geology of the Counties of Floyd, Paulding, Gordon, Walker, Catoosa, Whitfield, Murray, and Cherokee, before expending much money or labor in hunting that valuable fuel. The surest index for his guidance will be the "black slate" stratum, which underlies the coal-measures, the mountain limestone and silicious group above and overlying the coal-measures, the red sandstone, limestones, and shales. Under the black slate you find the "dyestone," so abundant in East Tennessee, and running into Georgia, and, accompanying that, the magnesian limestone, both formed long before the deposition of the coal-measures, and which, consequently, can contain no coal.

Considerable labor and expenditure have been made in *Tennessee to* find "anthracite" coal, as many of the accompaniments were found to be identical with those of Pennsylvania. The same extend into Georgia, yet the distance of this region from the grand axis of plutonic rocks precludes the possibility of its existence, for bituminous coal-beds must be brought in close contact with a high degree of heat to expel the bitumen and sulphur from the coal, and reduce it to what we call "anthracite." The temperature of this whole region is very mild and pleasant, the thermometer rarely reaching above ninety degrees in summer, though for a few days in June and July it ranges as high as ninety-five degrees. In winter it is never very cold; and though snows prevail, they do not remain on the ground longer than a few days, or, at most, a week, rarely exceeding six inches. The only really disagreeable weather in winter is from the occasional prevalence of north-west winds, which, coming from the cold and snowy plains of the Rocky Mountain slopes, are very unpleasant.

North-west Georgia is not only healthy, but contains many celebrated mineral springs, the most of which are in Catoosa, Walker, Floyd, Dade, and Whitfield. Those of Catoosa are justly celebrated, and much frequented. Bartow County has also some good chalybeate springs, which were formerly much frequented, but are now being superseded by others of no better quality.

In Cherokee there is a very valuable mineral spring, this is with the most slovenly culture, and without manures. The same lands, with rotation of crops, deep ploughing, subsoiling, turning under green crops, with a little lime, every third year, as now being introduced and practised, yields from thirty-five to fifty bushels of corn, and from fifteen to forty bushels of wheat, which is found, by subsoiling, not to freeze out or suffer from drought, and the clover, or other green crop, turned under with carbonate of lime, forms an increased supply of phosphate of lime by its chemical combinations with atmospheric agents, and doubles and trebles the crop, and in twenty years raises exhausted lands to their highest capacity for production, besides furnishing bountiful stores of the richest hay, — from three to four tons per acre, — which swells the milk pail and the butter firkin beyond the fear of exhaustion. The want of population to effect a revolution in agriculture, and capital to develop our dormant energies by competition, are greatly needed in every part of the state. Both will come with the completion of our railroad system.

The price of living is cheaper than in the Pacific or Northern or Western States. Flour can be had of the best quality for $7 per barrel, and a very good article for $5; wheat can be bought for $1.25 per bushel; corn ranges from 50 to 75 cents, and, when a short crop happens, it reaches $1; hay commands $30 to $40 per ton, and would be higher but for competition with New England hay. This is a crying shame on the foolish and child-like negligence of our farmers, who could produce four tons per acre of the finest clover, timothy, and redtop, with orchard grass, Bermuda grass, and crab grass, which is twice the crop of the farmers of Massachusetts, who find us in hay, ship it a thousand miles, and sell it lower than our farmers desire. This suicidal course is but short lived. A few hundred far-seeing farmers from abroad will introduce the culture of the grasses, not only for hay, but for renewing the soil, and giving the farm its full powers of production.

Butter brings 20 cents per pound in North-east Georgia; some more, farther south and west; beef, 4 to 5 cents; pork, 8 to 10 cents; bacon, 15 to 20 cents; mutton, 8 to 10 cents; work horses, from $100 to $130; saddle, $130 to $200; carriage, much higher; good milk cows, $20 to $30; sheep, $2 to $3; Cashmere goats, full blood, for breeders, $2000 to $3000 per pair; half-breeds, from $50 to $100. No business would pay better than raising the Cashmere goat in the North-east Georgia mountains, not only for their wool, but for propagation elsewhere in the United States.

The price of labor varies according to the size of the city, or the demand. From $2 to $3 per day for carpenters and masons. Extra workmen, higher, and in the country from $1.50 to $2. Lumber, $15 per thousand. *Common* day laborers, $1 per day.

The price of unimproved, wild lands is from $1 to $3 per acre, and improved lands, distant from a railroad, are worth from $10 to $20 per acre, but on a railroad line they sell for $40 to $50, depending on the quality and quantity of alluvial lands on the tract. The fish of the streams in North Georgia are several species of cat, one of huge dimensions, — common to the tributaries of the Tennessee River, — the trout, sucker, pike, shad, sturgeon, buffalo eel, perch, and gar. Game is plentiful, of all kinds, to satisfy the wants of luxury, as well as sport, consisting of deer, bear, fox, wolf, beaver, muskrat, otter, opossum, squirrel, rat, mouse, ground hog, panther, mink, polecat, turkey, duck, wild goose, pigeon, partridge, snipe, woodcock, pheasant, &c.

CHAPTER XIII.

EDUCATION. — COMMON SCHOOL SYSTEM. — UNIVERSITIES AND COLLEGES. — ENDOWMENTS. — EXALTED CODE OF MORALS. — MACON FEMALE COLLEGE. — LA GRANGE AND THE MASONIC FEMALE COLLEGE AT COVINGTON. — GEORGIA THE FIRST STATE OR NATION IN THE WORLD THAT BESTOWED ON WOMAN THAT HIGH CHARACTER, AND GAVE TO HER THE POSITION IN THE SCALE OF BEING WHICH GOD CREATED HER TO OCCUPY.

THE system of common or public school education has been neglected very much of late years, in consequence of our sparse population in most parts of the country, and our former system of slavery, which enabled the favored portion of our people to receive a liberal education, generally obtained from abroad or from the northern colleges. The middle classes and the poor were but meagrely provided for by the legislature, who had made but little provision for a general system of common schools, in consequence, as before stated, of the sparseness of the population or settlements, and the inadequate compensation to secure the services of competent teachers. In the cities and towns it is otherwise, and latterly many settlements have become sufficiently populous to bid defiance to an unjust legislature, and support good schools by private means.

The first Constitution of Georgia was adopted in 1777. The fifty-fourth section evinces the high appreciation of the importance of education by its framers, and is worthy of our sincere admiration and sanction. It reads, "Schools shall be erected in each county, and supported at the public expense."

In 1783 the legislature donated one thousand acres of public lands to each county for the benefit of public schools; but in those days lands were of little value, frequently less than a shilling per acre. In 1784 the legislature donated forty thousand acres for the endowment of a state university, and a charter was granted for it the next session. In 1795 one thousand pounds sterling were granted to each county for common schools, but never realized; and many donations of one thousand, and one of two hundred and fifty thousand, were made, but were rendered nugatory by an injudicious knowledge of the subject, and much of it has been lost in consequence.

Many private institutions have been established on a liberal basis; but a general system of common schools is badly needed, which the last legislature have tried to supply. They passed a bill, embracing a very full and extended system of common school education of a dual character, to suit or be fitted to the wants of both races — black and white; but much difference of opinion prevails with regard to its practicability, particularly in regard to the negro; and another powerful impediment to its success with either race is the same that applied to the appropriations of former years for half a century past — the inability of the legislature to raise the money.

This last educational law was passed on the 13th October, 1870, making the governor, secretary of state, attorney general, comptroller general, and school commissioner, a "board of education," who shall order elections of trustees and commissioners in each county, with power to appoint teachers for all the schools for such times as are adapted to the available funds, &c. The law involves a liberal system, and will afford all the facilities needed, provided the people can meet the exorbitant tax necessary to support it. The general prostration of all industrial interests renders its introduction very inopportune at this time, but a few years will produce a change favorable to its general introduction.

It is a sad reflection to know that Georgia once owned all of Alabama and Mississippi states, a princely domain, which, by judicious legislation, like Connecticut, would have given her an annual income of five millions of dollars to support a magnificent school system; but by base fraud, exercised by the paid servants of the people, that princely domain was given away for a bauble, and Georgia left to tax her people for money to carry out a limited school system equal to less than half the wants of her people.

The citizens have subscribed over a million of dollars within a few years for the endowment of private colleges and institutes; but that does not reach the common people, who are unable to pay board and all the incidental expenses necessary to an education from home. They want a school in each district, as the law now provides, so that each child may receive benefits alike, whether rich or poor, and this system seems now most feasible.

The University of the State was located at Athens, in Clarke County, on the Oconee River, about seventy miles south of the mountains, in a gently undulating country, which is composed of primary rock, and of course affords good, pure water. The predominant rocks are granite, felspar, gneiss, micaceous and talcose slates, and hornblende. The water power is equal to that of any part of Georgia, and improved by two first-class cotton factories, grist and flouring mill, paper mill, foundery, &c., with a waste surplus equal to millions. The soil is not so good as in other sections, particularly North-west Georgia, yet, with proper management and culture, is capable of yielding large profits. The quantity of wheat per acre, under the direction of the modern system of agriculture adopted by the Athens Agricultural Club, amounted to from forty to fifty-four bushels of wheat per acre; corn, from ten to forty. The culture of the grape is being extended, and the results from the Scuppernong are very encouraging, and promise a certain yield of fourfold more than any European or northern grape, three vines of which, thirty-seven years old, produced one hundred bushels. Four miles below Athens, on the Oconee River, in a micaceous slate, are found fine beryls, which indicate the existence of the matchless emerald.*

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* The beryl, says Pliny (xxxvii. 22), was thought to be the same as the emerald, which opinion has been confirmed by modern chemical analysis; the composition of each, — silica, alumina, and glucina, — colored by different proportions of the oxide of chrome and iron. Philips, in his Mineralogy, says the beryl differs from the emerald only in color. But the beryls are harder, being denoted in the scale by 7.5 to 8, and superior to the garnet. The beryl held a higher rank among the Romans than among most other nations. Antique engravings on beryl are very rare, quite as much so as on the emerald. The earliest now known is the "Taras" on the dolphin in the Praun collection, the design of which is placed by Winkelmann in the first class of Etruscan works.

A head of Proserpine, in the purest Sicilian-Greek style, and a hippocampus are in the Marlboro' collection; also a beautiful head of Julia Domna; but the most valuable and splendid intaglio is the bust of Julia Titi, which has created great interest for a thousand years among artists and amateurs.

Its great abundance in Siberia and America has reduced its value in modern times to almost nothing. There are two in the British Museum, from New Hampshire, of great size. One weighs forty-eight and the other eighty-three pounds! The beryl is colored by the *oxide of iron and manganese*, and the *emerald by the oxide of chrome*. Otherwise the composition is *the same.*

The city of Athens contains four thousand inhabitants, chiefly families who settled there for the benefits of education, and constitute a community of the greatest intelligence and moral character. It is here that religion receives her just devotions, and the highest appreciation of a discriminating public. No community in any country or nation have a higher or purer standard of morals. The University commenced its exercises in 1804, and has been gradually increasing until now, when the number of students amounts to nearly three hundred. The buildings are neatly but cheaply constructed, costing about one hundred and twenty thousand dollars. The course of study or education is full, liberal, and efficient. The library and laboratory cost about twenty-five thousand dollars. The institution is under the direction of an able corps of professors, who are not only qualified by profound classical lore, but all men of the highest moral and religious character. We risk nothing in saying that no institution is more deserving of patronage, in consequence of the exalted code of morals and religion maintained, which is the entering wedge or stepping-stone to those grand and sublime developments of the human mind which stamp us as being "after the image of God."

Mercer University, at Macon, is a Baptist institution, where her members are prepared for the ministry. It is conducted ably, and is of a high character for moral training, well endowed, and exercises a good influence on all the country.*

The Methodists have a female college at Macon, with two hundred and twenty students, under the supervision of the estimable and learned Dr. Bonnell, whose untiring energies must result in much good. This being the first female college instituted in the United States, or in the *world*, speaks volumes in praise of Georgia, and particularly of the citizens of Macon, who first burst the shackles of ignorance and superstition, which had bound woman for three thousand years, and kept her in the false position of a slave; whereas she, of right, and by the command of God, should be man's equal.

The University of Oglethorpe has been removed from near Milledgeville to Atlanta by the Presbyterian Church, and has commenced its exercises under a newly-formed faculty, composed of men of ripe scholarship and undoubted piety. This institution was established many years ago, but, owing to the unhealthiness of the climate or location, continued to languish, until the directors were forced to remove it to a more healthy locality, or abandon it. They wisely chose the former, and removed it to Atlanta, where it will now rise to the proud position of equality with the best institutions in the land. The determination of purpose of the directors, and the distinguished character of the present faculty, give every assurance of its prosperity and success. The legislature has recently made an appropriation, which will place it on an equal footing with that at Athens.

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* Since the Mercer University was removed from Penfield to Macon, the endowment fund has been increased from one hundred and fifty thousand dollars to five hundred thousand dollars, showing the high appreciation of the great importance of *education by* the citizens of Macon, who stand far above all *other communities* in Georgia in educational patronage.

Numerous other institutions of learning, patronized by the different denominations, are found in every part of the state. All have the same great aim — to elevate and ennoble female character, which necessarily elevates the other sex to a much higher state by the operation of the *immutable laws of God.*

In addition to the many male and female colleges and universities, the state claims three medical colleges, situated in Savannah, Augusta, and Atlanta. Many graduate yearly, and enter the medical practice for a livelihood, and, it is to be hoped, for alleviating suffering humanity. The profession in Georgia has always sustained a high character, and maintained an exalted position, eschewing all attempts at charlatanism and dishonorable means to act on the credulity of the people.

In the various institutions of learning, the growth of one hundred and thirty-seven years, we find all the valued facilities and talent belonging to the boasted institutions of Europe, which embody the accretion of one thousand years, excepting their libraries and cabinets, mostly, however, made up of useless collections, which swell the library without adding to its value. The libraries of Georgia are select, and the collections of natural history equal to the wants of the most polished scholar; in addition to which, in all these seminaries of learning, religion pure and undefiled is the great *beacon-light* which guides and directs the development of the young mind, and prepares it for the great responsibilities of life. God, the Creator and Governor of the universe, has commanded that every human being, if not prevented by providential dispensation, shall fulfil his destiny in the plan of creation, which consists, first, in planting a tree, and cultivating other productions of nature; second, in leaving some written or other imperishable evidence that they had existed on earth; and thirdly, by far the most important and positive requisition is to propagate their kind. When any human creature has complied with these requirements or commands of the Creator, like Adam and Eve, Abraham and Sarah, and millions of others which history chronicles; then, and not till then, can they die with the full consciousness of having obeyed the commands of a merciful God, and be prepared to hear that last earnest call of the Saviour, "Come unto me, all ye that labor and are heavy laden, and I will give you rest." This is the reward of a full *development* of the human mind, and gives hope and happiness to the toiling millions of all nations. It is furthermore the great reason that all governments should encourage and foster a liberal system of education, so as to make better citizens, and a more prosperous and powerful government. Look to the different nations of the world in modern times, and you see the proof of this so powerfully exemplified as to be *unmistakable.*

CHAPTER XIV.

THE FLORA AND FAUNA OF GEORGIA. — WIRE GRASS. — BERMUDA GRASS. — BIRDS. — MAMMALIA. — FISH. — REPTILES. — CRIME. — ATLANTA.

THE flora of Georgia is rich and diversified, consisting of six hundred and sixty-eight genera, and two thousand and eighty-eight species now classed, and large districts to be examined by competent botanists, which must necessarily result in the discovery of many interesting additions to science and the uses of man. All the meadow grasses common to Europe and the Northern States of America succeed well here, with two additional indigenous species of great value, both for hay and pasturage. The one is the Bermuda grass, so called from being first discovered in that island. It is so sweet and nutritious that all kinds of stock will leave every other variety of pasturage to feed on it, not excepting clover. It grows rapidly, and springs both from the seed and the layers, yielding in rich alluvial soil from three to four tons per acre, but on uplands only about half as much. Yet another value is attached to it, which is above all estimate. It forms so thick and compact a sod on all lands that the broken country and hill-sides are so perfectly protected against washing that no uneasiness may longer exist on that score. It not only resists all washing, but yields more plant-food by being turned under than anything except clover. It will not grow in the shade, nor withstand frost. When ploughed in November with a turning-plough, and exposed through the winter to the action of frosts, with a slight dressing of lime to decompose the roots, it is completely killed in North Georgia; and as shade kills it also, by mulching with pine straw or leaves it can be subdued. Again, the lespideza (*striata*), which grows well in the South, and is itself a valuable pasture grass, will completely eradicate it by sowing broadcast, and following with a heavy iron-toothed harrow. Every fourth year the ground should be turned under, deep and effectually, at least twelve inches in bottom lands, followed by a subsoil plough, breaking the ground twelve or fifteen inches deeper. This will surely prevent the wheat or oats being frozen out, and if planted in corn, will secure a good crop, without a drop of rain from May till August. The decomposition of the immense turf or sod of the Bermuda grass, already prepared by the lime for plant-food, will double the next crop, in addition to the continued improvement of the lands. The other is the *wire grass* of the tertiary formation, which grows wild, and succeeds only in the sandy shades of those boundless plains in Lower Georgia, where the soil is too poor to produce any other plant, except the "long-leaf pine." It is very nutritious when young and tender, and affords rich grazing range for millions of cattle, sheep, and other stock. When it ripens or matures, its seed-stock or stem is about two or three feet long, and remarkably tough, entering into the manufacture of hats, rugs, floor-cloths, bagging, and paper.

The birds of Georgia are quite numerous, and fill the air and forests with their music, which, in the mocking-bird (*polyglottus*), is unequalled and charming during the season of incubation. The variety of inflections and rich melody fills the soul of the astonished listener with feelings of indescribable pleasure. Another species, called the cat-bird (*carolinensis*), keeps up an amusing excitement by its awkward efforts at mocking other birds. Throughout the Southern States the cat-bird is found in every neighborhood; but the mocking-bird has a less range, and is by no means so numerous. Of five hundred and eight species of birds found and classed by the distinguished

Audubon in the United States, two hundred and seventy-three species are found in Georgia. The number of genera in North America is one hundred and ten. Of mammalia there are fifty-five genera and about as many species. Of shells, the genera number seventy, and species two hundred and forty-six. Of fishes, genera are forty-two, species forty-six. Of reptiles there are thirty-five genera and fifty species, at the head of which is the huge and unsightly alligator, one of the few species of those frightful and almost fabulous animals that once filled our tropical seas, lakes, and rivers with their disgusting and terrible presence. All those huge species have long since become extinct, and the few left are comparatively small and harmless, and mostly confined to our swamps and sluggish streams on the coast, and in Florida and south-west to Mexico, where his carcass is being made to contribute to the wants of man in oil and leather. The same region is the home of the *diamond rattlesnake*, which sometimes attains a length of twelve feet, and from twelve to even fifteen inches in circumference, and is remarkably poisonous and fatal in its bite. Another species is found in North Georgia, generally from three to six feet long, and from six to ten inches in circumference, also very poisonous; lives mostly in and near the mountains, and is less dangerous in consequence of giving alarm on the appearance of danger by a peculiarly *shrill and startling* noise, caused by the contact of the horny sections of their tail, called "rattles,"—hence the name. They are rapidly disappearing in both sections by the hog, whose skin is so thick that poison cannot be transmitted into the circulation, and their wonderful fondness for that snake makes the hog a very dangerous and formidable enemy. In the low-lands you find the annoying and diminutive mosquito, so troublesome in summer as to require a "bar," or network of gauze, around the bed at night to secure a moment's sleep. These pests are very uncommon in North Georgia, and in North-east Georgia no such nuisance is known. The altitude of the country mitigates the heat, and its perfect freedom from marshes, swamps, and other sources of animalcular development, frees us from their annoyance, and the coolness of the nights secures sound sleep and perfect rest to recuperate the system against the curse of malarious fevers, which are such a burdensome tax on the people. We have no such fevers, no tax for ice-water to allay ones thirst, as the country is full of never-ceasing fountains, gushing from the granite cliffs, as cold as the wants of man require, and a balmy atmosphere, as the ancient Greeks said, in which the gods might repose with satisfaction.

The temperature of the springs in the valleys and bench lands varies from sixty degrees to sixty-two degrees; on the mountain-side and hills, from fifty-four degrees to fifty-eight degrees. North-east Georgia can boast of less crime than any section *north or south*, or we may say in the world — well named, by travellers from the region of the Alps, "the Switzerland of America." In New York city, with a population of twelve hundred thousand, there were sixty-six thousand arrests for crime last year, and sixty-three thousand the year before; and in London many more in proportion to the population. In all Georgia, with the same population, there were but eighteen hundred arrests, and *three fourths of them were negroes;* and in North Georgia, with half the population, only eight hundred arrests.* No part of the civilized world can exhibit so high a scale of morals, which is certainly a very great recommendation, and inducement to foreigners to seek a quiet home, where their persons and property may be secure from the ravages of the bandit or midnight assassin, and where industry will soon receive her full reward, and health bless their labors. The largest city in North Georgia, and in the state, is Atlanta, in Fulton County, the state capital, containing, with its suburbs, nearly forty thousand inhabitants, who are decidedly the most enterprising, industrious, and determined people in any part of the South.† Their anticipations are on a grand scale, and all their public and private buildings and improvements are commensurate with them, and they will not be disappointed. *In 1839 it* was a wilderness, like Omaha, San Francisco, and Chicago, and in 1864 it was sacked and burned by the Federal army. From present indications, it will double its population in the next ten years. It is so situated as to become the great *distributing depot* for the South, *at all seasons of the year*, which Charleston, Savannah, and New Orleans cannot be, in consequence of the unhealthiness of those climates during the summer and fall months. Another advantage is in its becoming a centre for manufactures of hardware, cutlery, railroad iron, stoves, nails, furniture, carriages and wagons, agricultural implements, sulphuric acid, and fertilizers, cotton and woollen fabrics, paper, paints, and all kinds of machinery for working the gold, silver, and copper mines, and the plantation, and other branches of business. All these will obtain, as population increases, and the immense demand is fully realized by capitalists abroad, and the increased profits over northern or European manufactures of the same kind. At an early day these demands will force the construction of a canal from Hall County, sixty miles off, to bring the Chattahoochee River for supplying the city with water and *water power* equal to the driving of ten million dollars' worth of machinery, which will enable these enterprising capitalists to compete successfully with the world. It is destined to be a great manufacturing city, and from its central position, healthy climate, and the indomitable energy and perseverance of her citizens, must also become a focus of literature, science, and art. Already she has secured the location of one university and two colleges, and contemplates, at an early day, the establishment of a female college of the first class, which will exert a greater influence on her destiny than all others put together; for it is from woman's influence that all men receive the first impress of character, which stamps them as common or superior beings.

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* *See Appendix*, A.

† See Appendix, B.

Atlanta is composed of Georgians principally, with a large share of citizens of other states, particularly from the Middle and Northern, some of whom are unequalled in energy and perseverance, and what is now called go-a-headativeness. Nearly all nations are represented. The city government is mild, prompt, and efficient; person and property are perfectly secure; so of all the other cities and towns. The general intelligence of the people secures the appointment of reliable, honest, and competent officers, and the high tone of morals secures the unobstructed operation of the laws of the land. Fulton County contains rich gold ores, silver (argentiferous galena), iron, manganese, granite, gneiss, and other good building material, clay, and immense mines of asbestos, which some day will be of value in the arts. Its fibre is from six to twelve inches long on the surface, and indicates a superior article below the line of decomposition.

CHAPTER XV.

Great Coal Region of North-west Georgia. — Vast Iron Fields. — Cumberland and Lookout Mountains. — Water Power. — Agricultural Resources. — Caves and artificial Chambers cut out of the Rock. — Manufactures. — McLemore's Cove, &c.

The great coal and iron fields of Georgia, from their incalculable importance, require a more extended notice. As before shown, this geological section is confined mainly to the Counties of Dade, Walker, and Chattooga, though, by disruption and plication of the carboniferous strata, the Counties of Floyd, Catoosa, and Whitfield will be found to contain valuable detached sections of workable coal to aid in the manufacture of their immense fields of iron ore. The coal-seams of the Lookout and Cumberland range vary from one to twenty feet in thickness, but rarely average more than five feet. In Georgia the explorations have been so superficial as yet, that no opinion can be given which can be relied on. Judging from analogy and the few facts known, we place the thickness of the whole series of veins at ten feet. Professor Howard estimates them at six feet, which is evidently too low; fifteen feet would be nearer the truth.

There are three leading varieties of coal, known under the names of anthracite, bituminous coal, and brown coal or lignite. The chemical composition of these different kinds of coal will give the reader some notion of their nature and value, viz.:—

	Fixed Carbon.	Volatile Comb. Matter.	Water.	Ash.
Penn. anthracite,	87.45,	3.84,	1.34,	7.37
Penn. “	90.45,	4.88,		4.67
Maryland bituminous coal,	73.01,	15.80,	1.25,	9.84
Virginia “ “	50.99,	36.63,	1.64,	10.74
Indiana “ “	58.44,	33.99,	2.20.	4.97
Pittsburg, Pa. “ “	64.72,	32.95,		2.31
	Carbon.	Hyd.	Ox. and Ni.	
New Castle bituminous coal,	87.95,	5.24,	5.41,	1.40
Lancashire “ “	83.75,	5.66,	8.04,	2.55
Elbogen brown coal,	73.79,	7.46,	13.79,	4.96

The specific gravity of coal is 1.3. The carbon in charcoal, amounts to 99.07 per cent.; in cannel coal only 67 per cent.; and lignite 55; beech wood (dry), 40.

The assay of Dade County coal, by Professor C. U. Shepard, is as follows, viz.:—

	Gravity.	Carbon.	Volatile Mat.	Ash.
Rising Fawn,	1.304,	71.40,	19.00,	9.60.
Near Shell Mound,	1.340,	62.00,	28.00,	8.00.

This shows a fine quality of coal, calculated to be used very extensively in the manufactures of iron, and for all purposes for which a good coal is required. The character of the coal is bituminous, free from sulphur, and burns well, makes good iron, and works steel. It is used not only in stoves and fireplaces, but in all kinds of furnaces, and factories of iron, hardware, cutlery, and for locomotives and steamships. Judging from the size of the seams, and quality and quantity found to exist in the Phœnix Mine, in Tennessee, near Chattanooga, and other mines on the Georgia line, there can be no doubt but that the same coal-measures will open as well in Georgia, in the same formation. This has been proved already, near Winston, in Alabama, and many places in Georgia, forty miles south of the line. In geology, as in other natural sciences, "like causes produce like effects;" and the accompanying coal formations of Tennessee extend into Georgia for forty or fifty miles, with an average width of eight or nine miles. The altitude of the Lookout Mountain is about two thousand feet above tide-water, and thirteen hundred above the Tennessee River at its northern terminus, below Chattanooga. Like the Cumberland Mountains, of which range it is a part, and of the same formation, its borders, on the valleys and rivers, are very abrupt, and generally perpendicular. On the top of this extensive range, the ground is a gently-rolling table-land, with a clay soil, susceptible of a high state of improvement, and sufficiently undulating to produce springs and wells of water equal to the wants of a dense population. It will become noted for the culture of fruit, the apple, the potato, and the grasses and grapes, which, with all the other productions of cereals, beef, mutton, wool, wine, butter and cheese, will feed the mechanism and manufactures of iron, gold, silver, and copper, with those of slate, tripoli, fire-clay, bricks, crucibles, and a thousand other industries which North Georgia can supply. This mountain alone can supply all the wants of Georgia for countless ages in coal, iron, fire-clay, slates, and other useful minerals, which now are worthless for want of transportation. It is the opinion of the Rev. C. W. Howard, who made a reconnoissance survey of the coal and iron region of these three counties, and made a very able report to the superintendent of the state road, that there are, in addition to coal and iron, valuable oil districts, extending from Tennessee for fifty miles into Georgia, and thence to Alabama. His opinion is based upon the like results in Pennsylvania, and the highly bituminous character of the shales in the valleys between the mountains in these counties. The only objection to his theory is, the dip of the strata is all *westward*, and *our part of the great basin* is in the extreme *eastern terminus of the coal-measures; and all* the oil from infiltration must, from natural forces, tend to lower levels beyond our limits. It was this fact which ruined thousands of men in Pennsylvania, and beggared their families, and made princely fortunes for others.

One of the coves of this mountain is named M'c-Lemore's Cove, and is about twenty-five miles long and an average breadth of ten wide, of the richest quality of lime land. The cove is formed of a V-shape by the offshoot of Pigeon Mountain from the Lookout. The coal seams are now opened near Winston, where the veins are large and profitable, and the coal of superior quality. Parson Howard estimates the field to be forty miles long and six wide, containing one hundred and fifty-three thousand six hundred acres, which, if it only averages six feet thick, would be sixteen hundred million tons. But we know the coal is not confined to *one or two seams*, but to several more. In parts of Pennsylvania, and particularly in England, are twenty-three distinct seams, amounting in the aggregate to ninety-five feet thick. Professor Hitchcock estimates the thickness of the coal in this great Appalachian field at *twenty-five feet*, but thinks it twice that; and Mr. Howard places our section at only six feet; but we should not hesitate to place it at more than double that number, giving us over three thousand million tons, which will save us from dependence on our neighbors for at least two thousand years. The estimates of Rev. Mr. Howard, relative to the quantity and quality of iron ore, are certainly reasonable, and by no means high. No state, not even Missouri with her iron mountains three to six hundred feet high, can surpass Georgia in quantity or quality of iron. The falls of Little River, near the state line, are of immense importance to the manufacturing interests of the state, in connection with the vast coal and iron interests in immediate contact. Both coal and iron, in Pennsylvania, have, by proper development, and building canals and railways for cheap transportation to market, enhanced the value of real estate at least six hundred million dollars. In Georgia the area of coal is not so large; but her iron is better, more abundant, and can be manufactured cheaper; and both are of incalculable value, provided our legislature should adopt a liberal policy of internal improvements for transportation, and encourage the development of the coal and the iron, make an experimental test for oil, as Professor Howard suggests, and fix the value of the property by some high standard, which would revert to the interests of the tax-payers. For instance, the tax on the one hundred and fifty-three thousand six hundred acres of coal land in Georgia is about three thousand dollars, and the land worth two dollars per acre. Develop them, and they will average three hundred dollars, at a low estimate, per acre, and you have a land value of at least forty-six million dollars, nd a tax of nearly half a million to build up schools!

The iron will add as much more to swell the wealth of that now deserted region, which needs and calls for a little help from her mother to enable her to walk alone, and be "self-sustaining and self-creating." The first fall at Little River is forty feet, and the second eighty feet, equal to the manufacture of all the cotton and wool, wood, iron, and other minerals in the country for an indefinite length of time. At the top of this fall are three chambers cut out of the solid rock, like the ancient Edom and other troglodyte cities in South-western Asia. These chambers, at the Little River Falls, are evidently relics of the "mound-builders," whose works of art have already been noticed, and will occupy the next chapter. In their struggle to prevent extinction, this was one of their fastnesses, the Lookout another, and the Yona and Stone Mountains another, each of which, in early ages, was fortified. Shinbone Mountain is an outlier, or kind of second escarpment of the Lookout, and mainly composed of the richest iron ores. Another ridge east of this is called "Dirtseller," and covered with iron ore of fine quality, and to all appearance inexhaustible. Still farther on, east, you cross the Chattooga River and Taylor's Ridge, on the east side of which are boundless fields of iron ore. Tryon Factory, on this river, runs five thousand spindles and one hundred and sixteen looms, and pays large dividends, which would be increased if they had a railroad, to give cheaper and more rapid transportation. It is thought that one will be built, in the next three years, from near Kingston, by way of Arumchee Valley, to Cooper's Gap, on the Lookout Mountain. This will open a new field for investment and labor in coal, iron, and agricultural products, and doubtless be a stepping-stone to the full improvement of that whole region, and give support to millions of miners, mechanics, and farmers, with a goodly per cent. of fruit-growers and vintners, cotton and wool-growers, and manufacturers, with their adjuncts.

This vast iron region embraces all the silurian and taconic formation, on the eastern confines of which are situated the celebrated Cooper Iron Works and Rolling Mills, in Barton County, which were sold by Major Cooper, during the war, to the Confederate government. They embrace furnaces, forges, rolling mills, flouring mills, and saw mills, nail factory, &c., with all the appurtenances necessary to a first-class establishment. The nails and railroad iron gave general satisfaction. A branch of the state road runs to the factories on the north bank of the Etowah River, from near Cartersville. This river furnishes ample water power, and the property embodies some twelve thousand acres of lands. The ores of iron are very abundant, and easily procured. Previous to the war they used charcoal almost exclusively, till 1859 and 1860, when coal and coke were substituted, and will soon supersede charcoal altogether, on account of economy, as the coal mines in Georgia, Alabama, and Tennessee are now being opened so extensively that coal can be delivered at the furnaces cheaper than charcoal. These valuable works, water, and timber must secure to the operators and owners certain wealth, and add to the working classes constant and remunerative employment.

The vast iron fields from this to the carboniferous region in Chattooga, Walker, and Dade are altogether inestimable, as to the *quantity* as well as the *quality* of the iron ores, and must necessarily become one extended "Pittsburg" for all kinds of iron and steel manufactures. Professor Daniels, in speaking of Pittsburg, Penn., says, "If you would see what coal can do for a people who turn it to full account, look at Pittsburg, a city of one hundred and fifty thousand inhabitants, built up by its mines of coal. She lost thirty million dollars by the war without shaking her credit. No city contains more solid wealth in proportion to its population. Its prosperity is permanent, for it is based on *new values*, possessing in its coal the *creative power*. It stretches out its mighty arms, and gathers the wealth of half a continent into its lap. It brings to its furnaces and forges the iron and copper of Lake Superior; glass-sand from New England, Missouri, and Illinois; lead from Wisconsin and Missouri; *zinc, brass,* and tin from beyond the seas.

You pass through its gigantic establishments, and are amazed at the variety and extent of their perfected productions. Yet all these, from the most delicate fabric of glass to the ponderous cannon and steam engine, are in the *coal* which underlies the smoky hills of Pittsburg. If Pittsburg, in Pennsylvania, and Birmingham, Manchester, and Sheffield, in England, owe all their wealth and greatness to their *coal and iron*, what may not Georgia become, with her *coal and iron, and fire-clay, and glass-sand, and lead, and zinc, and fire-stone* for furnaces, *and copper, and silver, and gold* in absolute contact, or in close proximity? We have all the materials enumerated, except *tin*. No country on earth can, in any wise, compare with North Georgia in the *quantity* and *quality*, or the *diversity* of her minerals. Another great advantage she has over those boasted localities is in her endless water power, which dispenses with the costly steam engine, and its operators. It is no wonder that the Rev. C. W. Howard was so powerfully impressed with the vast and incalculable advantages we possessed, and the culpable neglect of our legislators in not making appropriations to develop them. Any statesman and political economist, after examining the true state of our mineral resources, our water power, our climate, and unequalled agricultural and manufacturing capabilities, must be overwhelmed with the astounding results of the developments of the next score of years, when a dense population will fill our valleys, and the hum of machinery resound from a thousand towns and cities. Yet this will be ere another age completes its cycle. Then we shall not be cursed with politicians, but have industrious and just men to legislate for the good of the whole country.

Our coal-field, as before shown, is not more than one hundred and sixty thousand acres, which, without development, is worth, on an average, less than two dollars per acre. The same number of acres, fully explored in Pennsylvania, will command from five hundred to two thousand dollars per acre, an average of twelve hundred and fifty dollars per acre against two dollars! The same lands in England rate now at from two to five thousand dollars per acre.

These figures seem fabulous, but they are true, and we have only to make a trifling appropriation for railroads and geological surveys to realize our highest expectations.

The anthracite coal region of Pennsylvania contains only four hundred and eighty square miles,—hardly twice as large as ours,—and yet it is now valued at eighty million dollars, and the amount of forty million dollars is invested in mining it! The cost of railroads to transport the coal to market amounts to seventy million dollars, and for canals for the same purpose forty million more! Yet there is no iron value connected with these estimates, which, in North

Georgia, would *more than double* the amount. These estimates are taken from an able work, lately written by T. H. Daddow, of Pennsylvania, who is quoted by C. W. Howard in his report to Colonel Hurlbert on the coal and iron region of North-west Georgia, and may be relied on as unquestionable authority.

CHAPTER XVI.

RELICS OF ANTIQUITY. — "MOUND-BUILDERS." — AZTECS. — FOOTPRINTS. — SCULPTURES. — ENCHANTED MOUNTAIN. — DE SOTO. — SHAFTS. — MISSIONARIES. — NACOOCHEE'S TRAGIC DEATH, &C.

THE relics of antiquity, which abound in Georgia from the Atlantic Ocean to its northern border, and onward to the southern shore of the great lakes, and from the Alleghany Mountains to the Rocky Mountains, are positive evidence of the existence of a powerful nation of people in remote ages, who were semi-civilized, and quite as far advanced in the arts as the Chinese, and in the science of war they had no superior, either in ancient or modern times.

No other history is left of this extinct race, except those vast tumuli which exist on all the rich plains and extensive valleys in Georgia and the Great West, which prove them to have been an agricultural people, in contradistinction to the Indians, who seem to have occupied, until a comparatively recent period, a different and coterminous province east of the Appalachian chain of mountains, and north of the lakes, and in the West India Islands. But in all their tribes, and throughout the vast territory which they occupied, no vestige of skilful workmanship, nor any of those stupendous fortifications, or necropolii, no idols, or other works of art were found. They were always savages and hunters, and preserved no records of the great nation who had become extinct and forgotten. The Mound-builders left extensive fortifications, constructed upon the most perfect and mathematical principles of modern warfare; and huge cemeteries, filled with bones and relics of art of elegant workmanship, mementos of copper sacrificial vessels, translucent quartz, disks, granite, greenstone, and obsidian mortars, the perforated marginella shell, from the northern shores of the Gulf of Mexico, and found nowhere else in the world, stone axes and hammers,* idols of granite, greenstone, and porphyry, mirrors of mica (*membranacea*), from twelve to eighteen inches in breadth by thirty-six inches in length, are found in their cemeteries, throughout this once vast empire of more than two thousand miles in extent,

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* The ceraunia, which Isidorus says falls from heaven in thunder-storms, is nothing but vitrified quartz, or sand, where lightning strikes the earth. But Socatus, who is quoted by Pliny as high authority, makes two other kinds of ceraunia — the black and the red, found in the shape of *axes*, or hammers, "held as holy things, by which cities and fleets could be saved or captured by their means." The comparison of this class to *axes* would have remained inexplicable were it not for the German name for stone axes of the primeval Celts of "donner

kiel," or thunder-bolt. Such, they still believe, fall from the sky in thunder-storms, and are dug up wherever the lightning strikes the ground. Thor, the Teutonic Jove, is represented with a huge *stone axe*, or hammer, instead of the thunder-bolt. They are still dug up in the vicinity of ancient temples, where they were doubtless used as sacrificial implements, long after iron and steel superseded stone. The Romans, to a late period, in ratifying a treaty always killed the victim with the *holy stone axe*, which explains the language of Socatus. These stone axes and hammers are found in all the tumuli of the mound-builders, as well as the savage Indian graves, or stone-heaps; for most of the southern Indians placed their dead on the surface, and covered it with stones for two or three feet deep, in which you find the stone axe, pottery ware, pipes, and arrow-heads, but no other works of art, in porphyry, quartz, chert, obsidian, or granite, generally in steatite, or some soft stone.

Their existence proves the long-established fact that in the earlier ages of the world man had no knowledge of the metals, and used the stone axe; but after thousands of years, the *bronze* age was introduced, and, by experiment or accident, invention was stimulated, and man discovered the use of *metallic axes*, made of a mixture — a natural one, probably — of copper and tin; and in another thousand years man discovered that iron, subjected to heat in charcoal, became much harder, and thus steel was introduced, and the *iron age* was perfected, and axes were made of it without knowing the cause of its great hardness. From this period iron and steel implements were used; and to this sublime discovery man is indebted for all our rapid progress in the arts. The stone axe of the Romans, of the Celts. the Gauls, and the Mound-builders and Indians is the same first effort of man to sustain himself. Each nation invented it independent of the other. It was a necessity.

proving a powerful and despotic nation, and far advanced in civilization. The fact that the native copper vessels and trinkets are found in all the mounds, and also the beautiful marginella shell, only found on the north shore of the Gulf of Mexico, from Tampa Bay to Honduras, the native copper, only found on Lake Superior, proves positively that the same people had commercial intercourse throughout all that extensive territory, and left the same relics. This was never the case with the savage, nomadic tribes in any part of the world. A stronger proof is in the anatomy of the skeletons, which are alike, and entirely different both in height and configuration. The savages, both south and north of this territory, were from six to thirteen inches taller, with higher frontal bones, and more commanding contour. The Indians never worshipped idols, never had a government, and were ignorant of the arts, though doubtless put upon this continent, in their appropriate provinces, at the same time the "Mound-builders" were, and the Esquimaux in the arctic regions of America.

The Mound-builders certainly were not the same as the Aztecs of Mexico and Peru, who inhabited that country when Cortez and Pizarro invaded and conquered those countries in 1521 and 1532. In 1520 Cortez murdered the King of Mexico, and committed unheard-of acts of inhumanity. These nations were *far advanced in* the arts of sculpture and architecture, and understood the use and working of metals, of gold and silver, but not of iron. Some of their temples are of stupendous size, and built of huge granite blocks, almost equal to those of Egypt.

The grand temple of Cholulu, the base only of which is now left, is the largest in the world, and doubtless built by some despot, who, like Nero or Tiberius, had no conception of the finer feelings, or any noble trait of soul, but wreaked his spite on a down-trodden people, and destroyed thousands weekly, to carry out an absurd notion of grandeur, which he only could comprehend.

All the relics of antiquity, from Mexico to Peru, are the work of the same race, and evidently distinct from that of the Mound-builders or the Indians, and clearly prove Adamic origin, and the imbecile Peruvians and Mexicans to be hybrids from amalgamation between the Caucasians and the Mound-builders.

The stupendous mounds at Grave Creek, below Wheeling, in Virginia, are from eighty to ninety feet high, and filled with human bones, and, occasionally, works of art. At Marietta, Ohio, are very extensive fortifications, enclosing fifty acres, built after the model of the Roman camps, as described by Josephus, Book V. chap. v. p. 219. The forts of the Romans were always square, like those of the Mound-builders, but those of the Danes, Belgæ, and Saxons were round.

On the banks of the Muskingum, at Circleville, are immense ruins of walls, enclosing near five hundred acres, built in a circle, and the brick (now decomposed) unlike anything in twelve miles. Here are forts and wells, with hewn stone, and, at Paint Creek, the ruins indicate a central or royal city. The fortifications are six in number. In one of these grand enclosures are three forts, one of seventeen acres, another of twenty-seven acres, and a third one of seventy-seven acres, with fourteen gateways from sixteen feet to one hundred feet wide, and at the terminus of each is a well from sixty to one hundred feet in diameter at the surface, proving they had no knowledge of the mechanical powers, but used steps to descend to the water. It is evident the Mound-builders were exterminated by the surrounding nations of Indians long before the advent of Cherokee, Choctaw, or other tribes into their country, for they have no tradition respecting the race who left those vast relics of human skill.

The Mound-builders were the highest species of man on this continent. Fernando de Alva gives a tradition of the Aztecs, that in 387 A. D. a colony of Toltecs from the north-eastern coasts of Asia were driven from their homes, and sought refuge in America, where they first came to California, and coasted southwards till they reached Southern Mexico, and settled a colony. Another portion kept on till they reached Peru, where they settled, and, in a few ages, founded a powerful government, and left those vast ruins which now command the admiration of the world. They held the country till the fifth century, when they elected a king, both in Peru and Mexico. These monarchies continued through the reign of nine kings, ending with the eighth century, when general wars originated and continued for one hundred and fifty years, spreading death and starvation throughout the land, during which time perfect anarchy obtained everywhere, nearly exterminating both factions, when the Aztecs, taking advantage of their divisions and weakness, invaded their country, and nearly exterminated the race.

Those who escaped were enslaved, and eventually amalgamated with the conquerors, and soon became extinct as a race. The Aztecs, by this hybrid addition, declined in physical as well as mental power, till the landing of Cortez on Mexican soil, when they became an easy prey to the avaricious and unfeeling Spaniards. Thus the conquerors of the Toltecs became extinct, and nothing is left save the vast and countless mounds scattered over the south and west. That they were an agricultural people is proved by the immense number and extent of their works of art, and their location being always on rich valleys or alluvial lands; and that they held commercial intercourse with far distant nations is proved by the relics of art found in the mounds with the bones of the inhabitants, which consisted not only of implements of husbandry and games of pastime, but ornaments for adorning the person, of copper, silver, gold, and the beautiful marginella shell, found only in a limited section of the Gulf of Mexico. These are exhumed from all the mounds. That the Toltecs were of Adamic origin is conclusive from the fact that none of the inferior races ever used hewn stone and brick in building, except the Mongols, — the highest type, — nor did they ever work in the metals, except in native gold and copper. They never understood the working of metallic ores. The Aztecs doubtless were hybrids, from amalgamation of the Toltecs with the Mound-builders or autochthones of this country. All the architectural remains from Mexico to Peru and Chili are the work of the same race, and evidently distinct from that of the Mound-builders or Indians, and clearly prove Adamic origin, and the imbecile Mexicans and Peruvians to be hybrids from amalgamation between the Caucasian and Mound-builder.

The Enchanted Mountain, in Union County, Ga., west of the Blue Ridge, contains sculptures in the rocks of human feet, horse, cow, deer, and bear tracks, and other impressions of various animals, numbering one hundred and thirty-six. These, with the hieroglyphic rock in Forsyth County, and some granite idols found in the mounds, are the only evidences of advancement among the Mound-builders, except their immense fortifications, which equal those of any age, either ancient or modern. This mountain is so called in consequence of a tradition among the Cherokee Indians that it always rains when any one visits the spot, "as if sympathetic Nature wept at the recollection of the sad catastrophe which the tracks were made to commemorate."

The Cherokee tradition is evidently derived from the teachings of the missionaries, who came with De Soto's army to convert the Indians to the Catholic faith, while De Soto and his followers dug the golden treasures from the bowels of the earth. This tradition says the great canoe landed on this mountain, and the "Big Warrior," with his hosts and cattle, and all kinds of animals, came out on the rocks and left their impressions, all of which are going westward. But the Creek Indians have a more rational tradition — that these tracks were made to commemorate a great victory, attained by a nation of people who lived here ages before they came. This is corroborated by extensive piles of rocks which covered the slain, and now mark the field of battle.

All the summits of the defensible mountains were once fortified by a race who lived here before the present race of Indians, and of whom they have no knowledge or tradition whatever. These stone walls are still visible on the Yona, the Stone, the Lookout, and many others, and give evidence of the great and terrible struggle of the Mound-builders to hold their country and prevent extinction. But, like the Aztecs in Mexico, long after, they had to yield to fate, and give place to the roving savage, who, in his turn, has been driven far away, and is now in the last expiring throes of extinction. Each has fulfilled its destiny in the plan of creation, and soon others will follow.

What is peculiar in the footprints on the Enchanted Mountain is that of the "Great Warrior," which is eighteen inches long and has six toes, while those of the women and children are natural, and all the animal footprints are natural, except one horse-track, which is seventeen inches long. This track, the Indians say, was made by the horse of the "Great Warrior," whose immense footprint is on the same line of march. These are evidently sculptures to commemorate some great event, as they are in *plutonic rock.*

This practice of the Mound-builders of leaving relics of art has existed in every part of the world where this species of man was capable of that development; but with the lower species, — the Esquimaux, the Malay, the American Indian, and the Negro, — no evidences have been left of even semi-civilization, no traces of a wish to perpetuate the memory of the dead, no sublime aspirations to associate with the Creator and his angels, no desire for immortality, except that of sensualism. It is only that species of man created after the image of God that can comprehend this subject, that can progress forever, that can appreciate the beauties of nature, can invent and develop the vast and hidden laws of God, and overcome all obstacles to success.

The mounds of Assyria and Egypt, of Europe and other countries, closely resemble those of the Mound-builders in America, and evidence a similar semi-civilized state of the people; but the difference between the relics of the highest species of the inferior races of man (the Mongols and Mound-builders) and the Caucasian is simply that the one has a limit to the development of mind, and in the godlike Caucasian there is no limit, whilst the Mound-builder reached his highest point of inventive genius in his fortifications, temples, and mounds.

The Adamic race progresses to the construction of marble and granite temples, the working of metals, and written language, the invention of machinery, and the character of all substances in nature from the composition of water and the blood of man and animals to the chemical constituents of rocks and soils, of the circulating sap of trees and all manner of vegetables, so that man now holds the key to the inner temple of God, and can command the use of these sublime stores, which are only created for superior human beings, and which increase in spiritual refinement throughout all eternity.

The relics found in the large mound on the Etowah River were a pipe of steatite, with the figure of a *human being* in a sitting posture, with hands upraised as if in prayer, the features by no means resembling those of the Mound-builder or Indian; a stone idol, of sandstone, twelve inches high, in a sitting posture, the same as the figure on the pipe, the knees drawn up almost level with the chin, hands resting upon each knee, full head of hair gathered into a knot behind, face upturned, eyes angular; no feature like the Indian, as its retreating forehead and chin, and the hair, with the fact that none of the Indian tribes were idol-worshippers, — all prove the relic to belong to a race who lived here long before their advent.

Adair, in his work on the Cherokees, says they never paid any attention to idol worship in any way whatever.*

Fragments of mica are found in all the mounds, which these people used for mirrors; and as there is no such mineral in the Great West, they must have procured them from the plutonic and metamorphic range of Georgia, Carolina, and Virginia. Dr. Atwater, who has made more extensive examinations than any other man, says that he has found this relic in more than fifty different ancient mounds, far apart, among which was the splendid specimen dug from the tumuli of Circleville, Ohio, which was thirty-six inches long and eighteen inches wide, and one and a half inches thick,† and on it a plate of iron which had become an oxide;* this, being the only instance of the use of iron mentioned by any author, as used by the Mound-builders, must be taken with many grains of allowance, for in all the observations for thousands of miles the author has seen no evidence that they knew anything of its use.

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* Adair's History American Indians, pp. 19, 22, Bartram's Travels, p. 495.

† See *Archæologia Americana*, vol. i. p. 225.

It is the opinion of Bartram, Atwater, and Jones, that the Mound-builders originally came from Mexico, and to that section from Asia; but this opinion is founded entirely upon the prejudices of early education, and a belief that all the human family came from one common parentage and centre. This fallacy has been exploded by thousands of facts, which have been developed in the last twenty years, in geology, archæology, chemistry, physiology, and botany, with their cognate sciences.

The Mound-builders were the "autochthones" of this part of America, and were put here by the Creator cotemporaneously with all indigenous animals and plants of that period, and never saw Asia. This position is proved by the additional facts that no fossil remains of any of these animal or vegetable species exist on the eastern continent, but are abundant on the western.

"Dr. Atwater says, in speaking of the antiquity of monuments of the Ohio Valley, that the botany of the country has been consulted on the subject. It *would have* required some time for the seeds of plants and trees to have been completely scattered over the whole country, extensively cultivated by a large population. Now, the only difference between the botany of the country where the works are found and those tracts where there are none, is, that the trees are the largest on and about the works. Trees of the largest size, whose concentric annual rings have been counted, have, in many instances, as many as four hundred, and they appear to be at least the third growth since the works were abandoned or occupied." *

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* See Archæologia Americana, p. 178.

This would place the age of these mounds far back in the table of time, at least two thousand years. All the mounds of Asia, of which history gives any account, attest the truth of this assertion; for whilst the magnificent temple of chiseled marble or granite has long since crumbled into dust, the mound stands as a lasting and unchanged monument of man's skill and powers of mind.

The mound at Aconithus, which the Persians built over Artachies, the superintendent of the canal at Athos, still stands just as it was in the time of Darius, and twenty-three hundred years ago the Lydians built a mound near Sardis, in Asia Minor, over the body of Alyattes, the father of Crœsus, which still remains perfect in its general outlines, while all of the numerous temples and works in stone are gone.

These facts prove the great antiquity of these

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* See Archæologia Americana, vol. i. pp. 219-806.

mounds, and, from their peculiar structure, no doubt exists but that the Mound-builders worshipped the sun, as did the Chaldeans, Peruvians, &c. These astronomical evidences exist at Big Grave Creek, in Virginia (on the Ohio), at Marietta, Kaskaskia, Cahokia, and Etowah River, in Georgia, as also at Macon and Nacoochee. All of these mounds have an elevated platform on the eastern side, upon which they doubtless offered sacrifices to the sun.*

A praiseworthy spirit of research has of late years been engendered, which it is hoped will result in important developments, and settle many mooted questions in archæology.

Lord Rawlinson is engaged in opening the buried temples of Assyria, in Babylon and Nineveh, and within the last year has found, in the basement of the temple of Nimrod, a pretty general outline of the history of the creation, inscribed in Chaldean characters in the bricks, as in the first four chapters of Genesis. This, of all other proofs, is the strongest that has ever been found of the authenticity of that holy and time-honored book.†

In 1539–40, the Spanish Chevalier De Soto, with twelve hundred men, and a number of missionaries, camp-followers, and adventurers in search of gold, landed at St. Augustine, in Florida, and immediately marched into the interior, keeping on the east of the Chattahoochee River to its source, at Nacoochee Valley, where he fought a bloody battle with the Cherokee Indians, who were totally defeated, and sued for peace. De Soto now commenced his search for gold at Nacoochee with one detachment, and with another the intermontane valley of Valley River, now in North Carolina, where his miners sank thirteen shafts from one hundred to one hundred and thirty feet deep; but finding less gold and silver than they expected, they abandoned the further search, and returned to Nacoochee, and clamored for a change, which, after much mutiny and dissatisfaction, De Soto granted, and marched south-westward, fighting their way through the Cherokees, Creeks, and Choctaws, until they reached the banks of the mighty Mississippi, above Natchez, where their commander took the fever, and in a few days found his end approaching. He called his friends around him, and gave them his advice, and expired. His body was put in a box and sunk in the turbid waters of the great river, and his ungovernable army disbanded, and roamed over the country for two years, during which time nearly all of the doomed army died, or were killed by the savages. A few arrived at the settlements of Tampico, and got back to

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* See Schoolcraft's History, p. 598.

† The discovery of the catacombs of Egypt, with their millions of mummies, long after the Bible was translated, is another incontrovertible proof of the truth of the Bible, for the dates on the sarcophagi run back five thousand three hundred years.

Spain to tell the sad tale of suffering and want. The beautiful valley where he sojourned so long still exhibits evidences of his battles and his mining explorations.

In cutting a canal through the alluvial lands of Nacoochee River, or Duke's Creek, as it is now called, the workmen opened seventeen log foundation-walls of houses sixteen feet square, the logs of oak and chestnut notched down with an axe,* and as sound as if done but yesterday — the only difference being the deep black color of the timber, caused by the water being impregnated with iron. These relics of by-gone days were from eight to ten feet below the surface, and the ground covered with a heavy growth of white oak, poplar, and hickory trees, from two to four feet in diameter, the concentric layers of which numbered two hundred and fifty, which from 1834, when they were dug up, would prove the work to have been done about the time of the Spanish invasion, and a little over three hundred years ago.

The windlass found in the shaft on Valley River was of post oak, hewed, and had an inch hole in each end, stained of a rich yellow color, as also were the bands round each end, proving the miners used iron bands and gudgeons; and one shaft for twenty-five feet passed through solid rock, and had been cut with a steel chisel, showing they had no blasting implements. All the casing-boards and timbers were sound below the water-level, but of a deep black color, from the decomposition of the sulphurets of iron and copper in the vein.

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* *This proves* they were not the relics of the Mound-builders, *for they had* no knowledge of the steel axe.

The name of Nacoochee, in the Cherokee language, means "Evening Star," from a beautiful princess who lived there when De Soto arrived in the country. She was the only daughter and child of Yona Ma Ya (the bear-killer), who earned the title by a wonderful and daring feat in his young days, killing two large bears, with their cubs, without accident or a wound of any kind. He was king of the country from the Tennessee River to the Savannah, and from the mid-region of Georgia to Alabama, containing a brave and warlike population of probably fifty thousand.

When the Spanish army reached his dominions, he fought them by day and by night, until they reached Nacoochee Valley, where De Soto erected fortifications on those of the long-lost Mound-builders, and fought a bloody battle for days, in which the slaughter was fearful — that of the Indians frightful, in consequence of the fire-arms of the Spaniards, and the latter being protected by walls. The Indians were totally defeated, and their beloved chief and king perished, leaving Nacoochee to inherit his power and fortunes.

According to the Cherokee legend, she was wooed by two chiefs of very different characters. The one she loved above all else was named Chestatee, whom she looked upon as possessing all the attributes of a good husband and man of honor. The other was Tallulah, a powerful chief, but totally devoid of all the finer feelings — captious, insolent, and exacting — in every sense a tyrant. He loved Nacoochee, and demanded her in marriage, as one who knew no denial. The council refused his request, and he from that moment swore vengeance against both his rival and the queen. Long watching an opportunity to gratify his revenge, it came at last. Nacoochee and Chestatee were enjoying all the happiness common to lovers, when their wily foe — the brutal and heartless Tallulah — suddenly burst upon their quiet, and plunged his dagger into the heart of Nacoochee, and then, quick as thought, drove the bloody steel deep into the breast of Chestatee, and with a loud yell of delight fled to his home on the Tugulo. They were both buried in the same grave, on the summit of a beautiful mound near by, on the banks of the Chattahoochee, where the requiem of the lovers is daily sung by the rippling waters, and the remembrance of the infamous and unprincipled Tallulah calls down the curses of all friends of humanity. A single tall pine marks the spot where they sleep the long sleep of death. The year before she perished by the hands of this wretch, she had parted forever with the pious and learned missionary Jordine, who accompanied De Soto, with the view of christianizing the Indians. He had labored earnestly and unremittingly for a year, with all the zeal, and fervor, and hopes of a child of God, but now was forced, unexpectedly, to depart with the army, and leave his field of labor, which, however, was with less regret, in consequence of the fact that all his labors had been in vain. The limited mental capacity of this seemingly doomed race satisfied him that all his expectations of such a consummation were fallacious, and they must adopt a different system to reach their condition in the scale of being, or creation. To compensate for this disappointment, the intense interest Nacoochee took in his labors and teachings begat a corresponding feeling of gratitude and admiration for one possessing such disinterested and noble principles, amounting almost to *love*. The chivalrous and unconquerable De Soto, also, was powerfully impressed with her simple manners and honesty of purpose, so different from the Indian character, which he had ever found to be deceitful and treacherous. As to love, De Soto had no conception — the miser, the conqueror, and the statesman know not, nor ever can know or feel, the indescribable, soul-thrilling sensations of *love*, which consists of congeniality of feelings, of ideas, of tastes, and of a blending of the souls of two beings into one, so as to be lost in each other. That is *love!* That love De Soto never knew; but he felt himself under reciprocal obligations to her for the many kindnesses she tendered to him whilst sojourning with her.

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The waving banners of the Spanish legions had passed the river, and were sweeping onward towards the setting sun, when De Soto, Jordine, and Nacoochee halted on the banks of the Chattahoochee, to exchange farewell greetings and prayers for the last time — perhaps forever. It was a solemn scene, and the pious father Jordine gave vent to his long pent-up feelings (for he was a Christian) in the following touching and beautiful language: "Farewell, my beloved Nacoochee; farewell to thy beautiful valley, its romantic scenery, its grandeur and loveliness. Farewell to the happy days I have enjoyed in the shades of thy magnificent forests, on thy cloud-capped mountains, and on the banks of thy crystal streams. A heartfelt adieu to all thy kind and benevolent people, who have cherished for me the warmest feelings which affection could prompt or friendship could warrant. Peace be to you; blessings attend you through all your lives, and eternal happiness be your reward after death. Never shall thy beautiful and lovely scenes be erased from my mind. Time may roll on his unresisting and oblivious car, crush the past and present, and open a vista to futurity, where the most splendid and fascinating scenes may be presented to wean the imagination and fancy from the past. Yea, the mind, ever active, and progressive to infinity, may grasp the ideal phantasm, and push onward from one chimera to another, *ad infinitum;* yet never, never will I cease to cherish a fond recollection of the scenes of Nacoochee. I go to a far distant land, to share the cold sympathies, and perhaps the hatred, of strangers.

"Vale of Nacoochee, adieu to your charms;
  A long farewell to all I hold dear,
Yet fond recollection still my heart warms,
  And gives to the past a sorrowful tear.
Encircled with a halo of fanciful dreams,
  Oft have I wandered, in silence of night,
On the green banks of thy murmuring streams,
  And given my soul to joyous delight.
I've clambered thy mountains crested with clouds,
  Viewed the wide distance of air, earth, and skies,
Stood on the dizzy brink the abyss enshrouds,
  And trembled with terror, with fear, and surprise.
These pleasures are gone; I taste them no more;
  By fate I'm driven to a far distant land;
Yet I bend to the will of the God I adore
  And cheerfully yield to his chastening hand."

Poor Jordine and De Soto! They both perished on the banks of the Mississippi, and no trace is left to mark their last resting-place. The turbid waters of the mighty Mississippi daily sweep over their bodies, but their souls are in another world.

But to return to the footprints on the Enchanted Mountain. To prove they were sculptures, and not impressions, it is only necessary to inform the reader that the mountain is composed of plutonic rock, and at that age of the world no animal or vegetable could exist, by reason of the earth's high temperature. God never put animals on earth until vegetation could exist to support them, which was impossible in its earlier stage, because of the total absence of soil, which could not be formed until decomposition liberated the lime, potassa, soda, magnesia, and other chemical constituents necessary to make plant-food. Then plants were introduced in their respective provinces as their habits and wants demanded, and *then animals* were put upon the earth, as we find in all the fossil remains in the younger rocks, but none in the older primary formation. Thus it is in the Enchanted Mountain, when all this region was made "dry land" by volcanic force; there was neither animal nor vegetable life in all the world, and the Great West and part of North-west Georgia, Tennessee, Alabama, and Florida were a deep sea. Long ages after this, the carboniferous system, with its coal-measures, its shales and limestones, and its sandstones, were deposited on its quiet sea-bed. The fossils of this extensive group prove that animal and vegetable life had progressed rapidly; yet no sign is anywhere found *that man and* the higher order of quadrupeds were in existence, because they could not live, on account of the sparse vegetation and the immense quantity of carbonic acid gas everywhere prevalent, and certainly destructive to all lung-breathing animals. In the next age, the rocks show, unmistakably, that the plan of creation was completed; and man, and all creatures and vegetables needed for his support, were put on earth, each in its proper province, and where it could live. Every fact goes to prove positively that those footprints are sculptures, and not impressions, as represented by Hawkins and others. They doubtless were made to record a great victory, as the extended stone piles in the vicinity indicate. The fortifications and cemeteries of Georgia are not only very numerous and extensive, but of the most stupendous character. On the Etowah River, near Cartersville, are ten mounds. The central and largest one is two hundred and twenty-five feet in diameter on top, and eighty-eight feet high, perfectly square, with a raised platform on the eastern side twenty feet high, upon which, no doubt, they offered sacrifices to the sun, as a granite idol was dug up at that point, in a sitting posture, with the hands elevated, as if in prayer. The other mounds are circular, and from twenty to fifty feet high. A deep ditch or moat runs from river to river, about half a mile in length, and thirty to forty feet wide, and thirty feet deep, cutting off a bend in the Etowah River of some fifty acres. About midway on the line of this ditch is an excavation which contains about an acre, and three hundred feet farther on is another square excavation of an acre, and thirty feet deep, made to procure earth to build the large square mound. Many relics have been found besides the idol — disks of elegant workmanship, rolling stones, sacrificial copper vessels, the elegant marginella shell, and gold beads (the latter found nowhere else).

Near Macon, on the Oconee River, are extensive monuments of ancient art of the same construction, and evidently built by the same race. In Campbell County, on the Chattahoochee River, are extensive tumuli of the most interesting character, and in Elbert County, at Nacoochee Valley, at E. P. Williams's farm, and at Colonel Nichols's, in the upper end of the valley, are very extensive and peculiarly constructed fortifications, which the Spanish chevalier De Soto used for defence against the Cherokee Indians in a series of battles, by which he was enabled to defeat the Indians. The same are found in Ohio, Indiana, and Illinois, as before shown, in Missouri, Kansas, Minnesota, Colorado, Arkansas, New Mexico, and Arizona; all of which proves a semi-civilized, despotic, and regular government, and in no wise connected with the Indian tribes living here when the country was first discovered, except the Aztecs of Mexico and Peru, *who long since* have become extinct. They were, as before shown, a distinct *species*, or more probably a hybrid race from amalgamation between the Caucasians, Toltecs, and the *autochthones*, or primitive inhabitants of America, called " Mound-builders."

The catacombs at Lexington, Kentucky, discovered by Daniel Boone and his ignorant followers and adventurers in 1775, are not only of great interest in a scientific point of view, but they are singularly unique, and different from any and all the relics found in North America.* The entrance to this subterranean cemetery was four by seven feet, and the vaults or catacombs fifteen feet below the surface. The entrance was walled up, and unknown to the Indians. The sides and ends of the cavern were formed into niches, occupied by the mummies, which the ignorant people destroyed under the impression that they were the bodies of their enemies (the Indians), who were then engaged in a cruel and exterminating war with the new settlers. They tore open the bandages or envelopes of the mummies, and made a bonfire of the bodies, completely destroying a rich and rare scientific collection, which can never be replaced, and which might have developed the origin of that mysterious race who once ruled this great country. This inestimable treasure, like the Alexandrian Library, has been ruthlessly destroyed, and mankind left to grope in the dark for ages, to arrive at a knowledge of the truth.

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* History of United States of America, by E. Guernsey, A. M., New York, 1852.

The catacombs are three hundred and five feet long and one hundred and seven wide, and, from the number of the niches and shelves on the walls, capable of holding two thousand bodies. The Indians had no knowledge whatever of the art of embalming, and, as no nation except the Egyptians practised the art, it is reasonably contended that all these ancient relics were left by a colony of Egyptians about 1500 B. C. As history gives an account of one Danaus and his fifty daughters anchoring at Rhodes in the year 1485 B. C., and as in the year 604 B. C., Necho, king of Egypt, ordered his fleet in the Red Sea to sail around Africa, sixteen thousand miles, which they performed, these scraps of history prove the Egyptians to have been a daring, maritime people; but the relics of ancient art in Georgia and the Great West are far from being Egyptian, and the anatomy of the bodies is equally unlike Egyptians or Indians, or any other nation of the human family. Besides these facts, there is an entire absence of any of these remains of bones or works of art from Labrador to Florida, on the eastern coast, proving conclusively that a colony from the eastern continent could not have peopled the country of the Mound-builders without leaving some evidences on the coast of their advent.

The Mound-builders were put here by God to fulfil the plan of creation, and are the "autochthones" of this province of this part of America, put here when the Indians were put on the eastern slopes of the Appalachians to the Atlantic shore-line, from the Savannah River to the St. Lawrence, over all of which no relic of ancient art has been found, except the rude pottery and arrow-heads so necessary to primitive existence.

We must not omit the mention of the hieroglyphic rock on the road-side between Canton and Dahlonega. It is in Forsyth County, and is a large granite block, about twelve feet long and four feet in diameter, covered with characters, among which are the circle, the square, and the triangle. It is the only relic of language found south of the Ohio; and must belong to the age of the Mound-builders. But who will rise up and tell the tale of its secret history?

Millions of human beings have lived and died in this country long years ago, and are forgotten. What a sad reflection! May we not be exterminated, and not a trace be left of our former existence?

The new-fangled theory of development, or evolution of organic life from chemical combinations of matter, producing endless forms, until the highest perfection of physical and mental life or being is attained, is fast obtaining belief, both in Europe and America. Dr. Darwin holds the foremost rank in framing the *absurd theory*. In his work on the "Origin of Species by Natural Selection," he says, "the effect of which is to unite the whole kingdom of life into one consecutive unfolding throughout."* He indorses the atheistic

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* European naturalists and ethnologists seem to be incapable of comprehending the subject of genera and species. They admit the American doctrine of diverse origin of the human races; yet they refuse to acknowledge the marked and incontrovertible difference between the *species* of the *genus homo*. The popular notion of a connecting link or chain of creation is false; for while it is a perpetual gradation from the monad and worm to man, there is no direct connection between the countless genera or families of being. The animal creation is composed of innumerable genera, each rising above the other, but distinct and independent, perfect in itself, and so completely separated from all others that the gulf is impassable. Each ascending series embodies all below it, but something is added to distinguish it; yet each genus is perfect, and independent of all others. Each genus, both in the animal and vegetable kingdoms, is composed of several species, for there is no such thing as a *single species*.

Thus, in the genus Quercus there are thirty-one species, and in the genus Equus, the horse, the ass, and zebra. The felines, by the score, run from the cat to the majestic and terrific lion; yet, with stronger marks and more specific differences, these naturalists refuse to acknowledge the plurality of species in the *genus homo*.

Sir Charles Lyell states, in his Antiquities of Man, page 9, that stone axes and flint knives were found in peat bogs in Denmark, beneath a buried Scotch fir tree, at the depth of thirty feet. MM. Nillson, Forchhammer, and others have found so many implements of human workmanship, of flint and greenstone, in the same situations in peat bogs, that they have been thus able, from their situation, relative to preserved trees in the peat, to fix the three ages of stone, bronze, and iron with great certainty. The age of stone in Denmark and the north of Europe coincided with the period of the first vegetation, the Scotch fir, which has not existed in Denmark since doctrine of the modern French and German schools, that there is a cause of motion in matter, independent of God. M. E. Saigey, Drs. Huxley and Spencer, are

the *historic period*. The oak period is found with implements of bronze, for swords and spears of bronze have been found in peat, with oak *above* the layers of fir trees and stone hatchets, and above all, iron implements with the beech tree. (Marlot, Sci. Nat. Book vi. p. 292.)

The next evidence is found in the existence of stone hatchets, knives and other implements of stone, in the "shell mounds" of Denmark, Massachusetts, and Georgia, but nowhere any evidence that they used the bronze and iron until a later period, except in the province of the Mound-builders in Georgia, the Great West, Mexico, and Peru, where they used gold and copper before the epoch of bronze in Europe.

The bones found in these mounds are of *living species*, which proves the advent of man upon earth to be very recent, geologically speaking, but far back in time historically. Lyell estimates that these relics of human workmanship were deposited in Denmark at least sixteen thousand years ago; and M. Marlot has found in the Delta of the Tamaire River, thirty-two feet deep, in a railroad cut, similar evidences. The first layer of detritus is about eight feet deep, when you reach a stratum, seven inches thick, of vegetable mould, containing Roman coins and other works of art, dated back eighteen hundred years. In the second layer, at ten feet, are found bronze implements and pottery unglazed, which he estimates at four thousand years. When they reached nineteen feet in the loam, they found a human skeleton, bones, &c., of the stone age, which he estimates at seven thousand years, making twelve thousand eight hundred years. But his and Lyell's are very vague estimates, for they admit that the evidences are positive that man's advent was cotemporaneous with arborescent vegetation. If so, the Scotch fir, and oak, and beech, making up his three ages of twelve thousand eight hun*dred years, all* contributed to form the coal seams of the car*boniferous* group, which could not be measured by millions of the modern exponents of the dreamy and untenable doctrine.

If the savants of Germany and France would admit

ages. This is confirmed by the fossil skeleton found in the loess above Natchez, forty feet from the surface, in the miocene tertiary, associated with extinct relics of the ox, mastodon (Ohioticus), and other genera, measuring more than one hundred thousand years. All these evidences apply to inferior species of man. The Caucasian gives no evidence of an advent more remote than ten or twelve thousand years.

The theory which establishes a connection between the absence of all vertebrata in the silurian and taconic formations, and the presence of man in the newest, which affords a more plausible explanation of the successive appearance, in strata of intermediate age, of the fish, reptile, bird, and mammifer, has no ordinary interest and claims to our favor, as comprehending the largest number of positive and negative facts, gathered from all parts of the globe, and extending over countless ages, that science has, perhaps, ever attempted to embrace in one generalization. Thus criticises Sir Charles Lyell on the "Origin of Species by Natural Selection," which is equivalent to indorsing it; but if we admit the doctrine of transmutation, we must include the human race in the same continued series of developments, and admit that they have been derived from the inferior animals. The opinion of all the Greek and Roman authors are united in regard to man being a rude, uncultivated savage in the first ages of his existence; and that opinion is still reflected by nearly all modern naturalists, who seem to be utterly incapable of throwing off the loathsome incubus. Aristotle and Horace have left a trace of this false doctrine — the latter in his Sat. lib. 1, 3, 99. The doctrine of transmutation in these verses has been criticised in the harshest and most contemptuous manner by modern Christians, who are guilty of *advocating* the same principles under a new dress, as promul*gated by Dr.* Darwin and Professors Spencer and Huxley.

Horace says, "When animals first crept forth from the newly-*ned earth,* a dumb and filthy herd, they fought for acorns that it requires as much Omnipotence to *continue* the laws of motion as to *create* them, then they would cease their senseless twaddle, and acknowledge that God not only created all things, and put them in their proper spheres, at times suited to their natures and habits, and that it is just as easy for him, in his general plan of creation, to make distinct species and genera as to have it done by "development," after the "natural selection law."

The old theory, with the Bible for our guide, is more rational and sensible than the ridiculous doctrine advanced by Dr. Darwin, and supported by Professors

and lurking-places with their fists, then with clubs, and at last with arms, which, taught by experience, they had forged." All the ancients, and modern European philosophers, err in not making any distinctions between the *species of man*. *The Caucasian never was a savage.* Some tribes and nations were more cultivated than others, but the Greeks, the Romans, Tyrians and Sidonians, the Persians, Egyptians, and Jews, were just such men as constitute the Adamic race to-day. They had as good an intellect and as noble and sublime ideas as we have, only different in the amount of ideas which we have gathered by the accretion of ages. If Horace and his cotemporaries, and Dr. Darwin, Huxley, and Agassiz, with Dr. Harrison, Beecher, Tilton, and the million would admit the truth as the Bible and science maintain it, that God created and *formed* the inferior races of man countless ages before the Adamic, and put them on the earth as their habits and natures required, then they could account for *the stone age, the bronze age, and the iron age.* The inferior races have a quick limit to their mental development, and *never* invented the working of iron and steel, were always savages; but the Adamic species, created after the image of God (Gen. i. 26, 27), never were savages, *and always* developed mind.

Huxley and Spencer, that the tadpole and frog, by superior chemical combinations, and electric affinities and eliminations, will produce a hog, a horse, a jackass, lion, elephant, and monkey — then rests for a while in the development of man! Dr. Darwin has surreptitiously gained the honor of authorship of this fine-spun theory. It was, however, taught by the Athenians in Aristotle's time, and resuscitated in France and Germany two centuries ago, where the dreamy and sensual sentimentalism of modern poesy prevails to an alarming extent.

"In the age of the Nibelungen Lied of German poesy, it had its second beginning, where for ages it fitfully nestled in its semi-barbaric vestments, until it culminated in the Goethean epoch," and spread its damning influence over all Germany, France, and part of the United States, where its dying trail is seen to leave a glimmering blight on the society of our northern and western states.

"This transcendental philosophy, and the brilliant age of poesy built upon it by the immortal Goethe, Schiller, Jean Paul, and Von Hardenberg, has rapidly vanished, and now German poetry and philosophy stand at a very low ebb, where a just appreciation of public sentiment will leave them for ages to come."

If they will admit the incontrovertible facts above stated, in opposition to "protoplasmic transcendental*ism,*" *then* they will believe that the active agent or principle, which governs all matter, not only in its motions, but in its life and being, is one of the essential attributes of God, intangible, invisible, immaterial, and eternal, and that is "electricity."

This moving cause and great agent in the universe is the soul of inanimate matter, and all the phenomena of nature are evolved in proportion to the kind of matter through which it passes, from ether and the molecule to the largest of bodies and the crudest of mediums. Electricity governs and directs the operations of matter in all its departments, from the germinating of the seeds of plants and the development of the lowliest leaf and flower to the grand and mysterious movements of countless millions of suns and worlds.

Electricity stands in the same relation to matter that mind does to the soul of man — each is the effect of a cause. The one is the motion of this cause through ether; the other is the action of the same universal principle or essential attribute of God on the soul of man, developing reason, which contradistinguishes man from animals. It is the larger and more perfect structure of the intellectual lobe of the brain in the Adamic race that characterizes them as a superior species to all others of the *genus homo*, because they were created after the image of God. They receive and transmit those electric vibrations, or the principle called *motion*, in a higher degree than any other created beings. Consequently we find none of the inferior races capable of forming a government, of inventing anything in the arts, or of advancement in science or literature.

In Asia, Africa, Australia, or the Pacific Isles, or among the Indians of America, we look in vain for the least symptom of taste or appreciation of the fine arts or the beauties of nature.

CHAPTER XVII.

CANALS. — RELIGIOUS DENOMINATIONS. — METEOROLOGICAL TABLES. — PRODUCTIONS OF THE STATE AND THE UNITED STATES IN 1868. — FISHES. — MAMMALIA, &C.

THERE are but two canals in Georgia, one at Augusta, where the water of the Savannah River is brought from the shoals, or first fall, nine miles above. It supplies the city with water, and drives several large cotton and woollen mills, with an extensive flouring mill, and other factories. One of the cotton factories runs fifteen thousand spindles, and makes fifteen thousand six hundred yards of cloth per day, with five hundred operatives. Its cost was six hundred thousand dollars, and is the model mill of the United States. The other canal connects the Ogeechee and Altamaha with Savannah.

The religious denominations are Methodists, Baptists, Presbyterians, Episcopalians, Catholics, and Universalists; a few Lutherans, Unitarians, Congregationalists, and Swedenborgians.

The Methodists, as before shown, have a college at Oxford, the Baptists a university at Macon, and the Presbyterians one at Atlanta, for preparing their members for the ministry. All the other denominations have institutes and high schools of the first order for the same purpose.

The different denominations live in peace and harmony, and yearly increase in Christian charity, and the more forcibly comprehend the fact that true and genuine religion does not so much consist in the observance of church ordinances and abstract principles, as in a desire to serve and worship God, and love all mankind. That constitutes true religion, and should characterize every follower of Christ.

The negroes have a separate church organization, given them by the zealous, learned, and truly pious Bishop Pierce, who has devoted much of his time, since their emancipation, in directing them aright, so as to elevate them in the scale of being. Their sudden change from bondage to the most liberal and full freedom has had an injurious effect on the entire race; but, by the fostering care of good men, they are rapidly forming societies, and striving to learn the rudimentary branches of a useful education, which will shield them from many temptations the uneducated rarely can overcome. A large majority of the negroes of Georgia and the entire South, during the revolution, or rebellion, adhered to their masters and owners, and acted in a manner the most praiseworthy. No acts of lawlessness characterized them. They stood by *their owners* generally with a zeal and consistency which stand as a lasting monument to their credit as a race, which all southern men and women will respect and acknowledge. But the attempt to force them into an abnormal state, for which they were not prepared, is deprecated by all Christian people, because it engenders strife, and operates to the injury of both races.

TABLE OF THE RAILROADS CHARTERED, AND TO RECEIVE STATE AID BY THE LEGISLATURE OF 1870.

	State Aid, per mile.
Albany and Columbus Railroad,	$12,000
Albany, Mobile, and New Orleans Railroad,	12,000
Americus and Florence Railroad,	12,000
Americus and Hawkinsville Railroad,	12,000
Americus and Isabella Railroad,	12,000
Athens and Clayton Railroad,	15,000
Atlanta and Blue Ridge Railroad,	15,000
Atlanta and Lookout Railroad,	15,000
Augusta and Hartwell Railroad,	15,000
Brunswick and Albany Railroad (additional),	8,000
Camilla and Cuthbert Railroad,	12,000
Chattahoochee Railroad,	12,000
Columbus and Atlanta Air Line Railroad,	12,000
Dalton and Morganton Railroad,	15,000
Fort Valley and Hawkinsville Railroad,	12,000
Georgia Seaboard and North-western Railroad,	12,000
Grand Trunk Railroad,	12,000
Great Southern Railroad,	12,000
Griffin, Monticello, and Madison Railroad,	15,000
Lookout Mountain Railroad,	15,000
Macon and Brunswick Railroad,	3,000
Marietta, Canton, and Ellijay Railroad,	15,000
McDonough and Western Railroad,	12,000
Memphis Branch Railroad,	15,000

Newman and Americus Railroad, ...	12,000
North and South Railroad, ...	12,000
North Georgia and North Carolina Railroad, . .	12,000
Ochmulgee and North Georgia Railroad, . . .	15,000
Polk Slate Quarry Railroad, ...	15,000
Atlanta and Richmond Air Line Railroad, . . .	12,000

METEOROLOGY OF 1868.

COMPILED FROM REPORTS MADE AT ATLANTA, MACON, PENFIELD, GAINESVILLE, IN GEORGIA, LOOKOUT MOUNTAIN, IN TENNESSEE, AND JACKSONVILLE, FLORIDA.

	JANUARY.						FEBRUARY.					
	Date.	Max. Temp.	Date.	Min. Temp.	Mean.	Rain and S.	Date.	Max. Temp.	Date.	Min. Temp.	Mean.	Rain.
Atlanta.	7	72	30	6	37.0	4.1	22	69	7	17	40.8	3.50
Macon.	7	76	30	15	44.6	7.9	19	68	1	26	47.4	6.90
Penfield.	1	—	30	16	—	—	20	68	7	24	44.9	—
Gainesville. . . .	7	70	30	25	47.5	6.0	20	70	7	29	49.5	6.50
Lookout Mt.,Ten.	7	66	30	14	40.0	4.50	20	63	7	14	41.2	2.0
Jacksonville, Fla.	7	81	31	29	57.6	2.80	7	78	21	27	59.6	2.25

	MARCH.						APRIL.					
Atlanta.	24	83	4	22	54.5	2.70	29	85	8	29	52.2	7.1
Macon.	16	85	3	34	60.0	4.20	30	85	8	41	63.1	11.8
Penfield.	16	83	4	30	57.0	3.40	13	66	8	38	60.0	5.65
Gainesville. . . .	16	80	8	40	60.0	2.70	15	70	10	41	55.1	6.74
Lookout Mt.,Ten.	25	80	7	21	50.1	5.04	30	82	7	35	60.4	9.60
Jacksonville, Fla.	16	90	5	46	66.7	1.30	20	92	8	50	72.0	2.83

	MAY.						JUNE.					
Atlanta.	5	89	9	46	66.3	4.26	19	90	23	58	72.6	0.50
Macon.	1	91	9	53	71.7	5.33	19	94	10	58	78.4	2.30
Penfield.	2	89	14	58	73.3	4.50	19	94	23	67	76.8	0.30
Gainesville. . . .	1	80	9	51	65.5	4.51	19	88	15	54	70.	5.80
Lookout Mt.,Ten.	27	89	14	49	69.2	3.0	19	92	21	56	72.3	1.90
Jacksonville, Fla.	6	97	9	67	78.3	2.85	18	98	9	70	79.8	12.40

METEOROLOGY OF 1868, CONTINUED.

	JULY.						AUGUST.					
	Date.	Max. Temp.	Date.	Min. Temp.	Mean.	Rain.	Date.	Max. Temp.	Date.	Min. Temp.	Mean.	Rain.
Atlanta.	17	98	8	66	77.8	3.10	31	90	16	59	71.0	2.17
Macon.	17	99	—	—	——	4.0	—	—	—	—	——	——
Penfield.	17	101	30	74	82.7	6.10	2	92	24	65	71.0	5.45
Gainesville. . . .	15	90	1	70	82.0	4.50	2	87	15	66	78.5	4.90
Lookout Mt., Ten.	17	96	30	70	80.1	3.20	11	88	13	64	76.5	4.2
Jacksonville, Fla.	17	101	31	74	82.8	7.70	11	97	23	74	83.6	4.70

	SEPTEMBER.						OCTOBER.					
Atlanta.	1	87	18	48	70.1	3.86	12	76	25	35	55.7	8.87
Macon.	—	—	—	—	——	——	—	—	—	—	——	——
Penfield.	14	90	19	48	74.3	3.18	12	79	24	37	61.1	3.20
Gainesville. . . .	1	80	18	46	63.5	5.80	12	70	25	23	51.6	2.10
Lookout Mt., Ten	8	85	25	49	70.0	8.4	7	79	9	42	60.1	1.68
Jacksonville, Fla.	24	94	18	62	81.2	6.15	8	88	24	55	72.9	3.20

	NOVEMBER.						DECEMBER.					
Atlanta.	9	74	27	27	44.2	3.60	20	62	12	6	37.4	5.12
Macon.	—	75	23	31	50.1	0.50	20	69	12	13	41.9	5 32
Penfield.	10	75	23	28	48.8	0.60	20	64	12	12	39.9	5.33
Gainesville. . . .	10	70	20	25	47.5	6.00	20	60	10	10	35.0	7.85
Lookout Mt., Ten.	9	72	20	26	48.7	3.80	20	62	12	8	32.6	5.20
Jacksonville, Fla.	10	85	21	35	58.8	.25	4	72	25	20	57.1	2.65

The temperature of the different seasons is shown in the above table, embracing four points in Georgia, one in Tennessee, on the 35° of lat., near Chattanooga, on the Georgia line, and one in Jacksonville, East Florida, south of the extreme southern border of Georgia. These observations will give the immigrant a very correct summary of the weather. In 1869 there was a drought, in most of the Southern States, from the 12th of June to the middle of August, so as to greatly lessen the crops, particularly on all lands which had been ploughed shallow, and not subsoiled; but on farms where the ground was deep ploughed, subsoiled, and a green crop turned under, the yield was nearly as good as common. This establishes the fact that deep ploughing, subsoiling, rotation, and the addition of lime, will enable the farmer to make a crop without a drop of rain after it is planted.

The following table gives, in round numbers, the grain and other productions of the state, in 1868, together with the estimated yield of 1870, with the total production of the whole United States:—

Production of Grain, &c., in Georgia, in 1868.	No. Bushels, &c. 1868.	Estimated Crop. No. Bush., &c. 1870.	Production of the U. States in 1868. No. Bush., &c.
Indian Corn. . .	27,000,000	30,000,000	906,000,000
Wheat.	1,212,000	2,000,000	230,000,000
Rye.	70,000	80,000	22,000,000
Oats.	1,182.000	2,000,000	230,000,000
Barley.	11,800	80,000	23,000,000
Irish Potatoes. .	318,000	600 000	106,000,000
Sweet Potatoes.	800,000	900,000	10,000,000
Rice.	40,000 cask.	50,000 ck.	200,000 c.
Tobacco.	1,212,000 lbs.	2,000,000 lbs.	320,000,000 l.
Hay.	8,500 tons.	60,000 tns.	19,000,000 t.
Cotton.	210,000 bale.	450,000 bls.	8,800,000 b.

The following table shows, in round numbers, the amount of live stock in Georgia, in 1868, the average price per head, and the total valuation of the whole United States: —

Description.	Number.	Average Price.	Total Value in United States.
HORSES.	75,000	$120.00	$600,000,000
MULES.	70,000	140.00	98,000,000
CATTLE.	350,000	14.00	306,000,000
MILK COWS.	260,000	22.00	361.000,000
SHEEP.	300,000	1.62	82,000.000
HOGS.	1,400,000	4.00	146,000,000

The population in the United States, in 1870, was thirty-nine millions. The population of Georgia, in 1870, is returned, by the United States census-taker, at one million one hundred and eighty-five thousand six hundred and thirty-seven, being only an increase of one hundred and twenty-seven thousand seven hundred and thirty-two since 1860. This small increase is owing to two causes. The first being the result of the four years destructive war, by which an immense number perished either in battle or by disease, from exposure in camp, by persons unused to such privations. The other cause is the action of Congress, which certainly is not predicated on those noble and magnanimous principles which should characterize a conqueror. The adoption of this policy drove thousands to seek homes in the Great West, in Mexico, Texas, and even Brazil. Most of these emigrants from Georgia soon became so much dissatisfied, that they sacrificed their remaining means to get back to

Georgia, as the climate and population of those countries, together with all their social relations, are so different that it could not be made agreeable, or even profitable. Since Georgia has been re-admitted into the great American Union, as an integral part, she again becomes a coveted home for all her expatriated citizens, whose only fault and error was their desertion of friends, home, and country in the time of their greatest need. We say to all of those remaining abroad, Come back and help build up a grand empire, by the development of one of the richest mining, manufacturing, and agricultural districts on the continent.

A few years more, and the tide of emigration will turn this way, and in ten years the population of our state will be doubled. In the census returns, the most difficult thing to account for is the increase of Missouri, Illinois, and Michigan, nearly three quarters of a million each, while Ohio falls off six hundred and sixty-four thousand and forty-three, Mississippi fifty-seven thousand one hundred and fifteen, and Virginia three hundred and eighty-six thousand seven hundred and eleven. This exhibit shows the home spirit of Georgians to be praiseworthy, and all patriots pray that this feeling may prompt them to remain and work with might and main, until we can claim that respect from all the coterminous states which we deserve and expect.

We omitted to mention the iron works in Habersham and Hall Counties, which have been suspended since the war. These ores are in a different formation from those of Bartow and other counties in North-west Georgia, and the quantity of ore is probably not so great, but the quality about the same. The veins in Hall County are on and near the Chattahoochee River, which furnishes endless water power for any ordinary line of business.

The works in Habersham are on both sides of the Soquee River—a branch of the Chattahoochee, which also furnishes extensive power at many falls within twelve miles. The almost unbroken forests afford the best of timber. Several furnaces and forges were worked for many years by a noted ironmonger, named Stroup, for the supply ot the home demand, in castings and bar iron.

In Lumpkin County, on the south side of the Chestatee River, is a large copper vein, the outcrop of which, for sixty feet deep, is composed of a spongy hydrous oxide of iron, from which the copper has been carried down by infiltration, leaving this iron ore, which the Cornish miners call "gossan." This was attempted to be worked for bar iron, but the copper in it prevented its welding, and rendered it so unpopular that its manufacture was no more attempted; yet, by proper application, the best of castings can be made; and also, by slow pressure, it will readily and *effectually weld.* The vein is from ten to twenty feet thick, and nearly vertical. One noticeable feature is its being highly auriferous, much of the ore worth from eight dollars to twelve dollars per ton for gold, and within a few rods of a twenty feet fall in the Chestatee River, equal to the manufacture of the ore in the cheapest manner. The south iron lead, in Hall and Habersham Counties, contains neither gold nor copper, though running parallel with and in close proximity to a rich vein of auriferous and argentiferous galena, containing the gold in paying quantities. About half way between these two metalliferous leads you find very rich magnetic iron; in the immediate neighborhood of the Potosi Mine, before mentioned, where have been found splendid octohedral and arborescent crystals of gold. The vein is a *true one*, as it traverses the strata, is nearly vertical, and the gangue is a mass of prismatic crystals of quartz and felspar. As the name imports, it was immensely rich; but the lode became exhausted at fifty feet, and but little effort has been made to find it again.

CHAPTER XVIII.

NEW COUNTIES MADE BY THE LEGISLATURE IN THE FALL OF 1870.—ANALYSIS OF GEMS, PASTES, &c.

McDUFFIE COUNTY was made from Warren and Columbia about thirty miles from Augusta, on the line of the Georgia Railroad, with Thompson as its centre, and Stonewall as its capital. It embraces large districts of the long-leaf pine, as well as oak and hickory land, and affords fine corn and wheat lands, as well as for cotton. The timber is very superior, and should be preserved with great care.

Rockdale County was the next laid off from Newton, De Kalb, Gwinnett, and Walton, and named Rockdale from the vast fields of granite which form the base and foot hills of the Stone Mountain. Its capital is on the Georgia Railroad, called Conyers. The lands are generally poor, except the alluvial bottoms on the streams, which are very productive.

The third and last one made lies on the Atlanta and West Point Railroad, on the west side of the Chattahoochee River, and was taken principally from Campbell County. This section is, like the former, poor, but has a good subsoil, and is capable of continued improvement.

Chemical Analysis of Precious Stones.

CHALCEDONY.

Silica,	84.0.
Alumina,	16.0.

Sp. gr. 2; 6 h. 7.0.

Agate, heliotrope, onyx, plasma, sard, are all varieties of chalcedony, differently colored.

Native form, botryoidal masses and rounded pebbles.

DIAMOND.

Pure carbon; sp. gr. 3.55; hardness, 10; electric by friction; native form, an octohedral crystal.

GARNET.

Silica,	33.75.
Alumina,	27.25.
Oxide of iron,	36.00.
Oxide of Mang.	0.25.

Sp. gr. 4.2; h. 6.5 to 7.5. Almandine; a rhombic dodecahedron, embedded in mica slate.

LAPIS LAZULI.

Silica,	49.0.	Sp. gr. 2.95.
Alumina,	11.0.	
Lime,	16.0.	
Soda,	8.0.	
Oxide of iron,	4.0.	
Magnesia,	2.0.	
Sulphuric acid,	2.0.	

OPAL.

Silica,	90.0.	Sp. gr. 2.0.
Water,	10.0.	

CRYSOLITE (PERIDOTE).

Magnesia, . . .	43.5.	Sp. gr. 3.3; h. 6.5 to 7.
Silica, ...	39.0.	
Oxide of iron, .	19.0.	

Primary form, a right prism, with rectangular bases, and round M.

SAPPHIRE, RUBY.

Alumina, ...	98.5.	Ruby, . .	90.0.
Lime, ...	0.5.	" . .	0.0.
Silica, ...	0.0.	" . .	7.0.
Oxide of iron, . .	1.0.	" . .	1.2.

Sp. gr. 3. 99; h. only inferior to diamond; native form, six-sided prisms, variously terminated, and in rolled masses.

SPINEL.

	Red.	Blue.	
Alumina, ...	74.50.	72.65.	Sp. gr. 3.5; h. 8.
Magnesia, ...	8.25.	14.63.	
Silica, ...	15.50.	5.45.	
Lime, ...	0.75.	0.00.	
Prot. oxide of iron,	1.50.	4.26.	

Native form, the perfect octohedron.

TOPAZ.

	Brazil.	Saxony.	
Alumina, . . .	47.5.	59.0.	Sp. gr. 3.49 to 3.56; h. 8.
Silica, ...	44.5.	35.0.	
Fluoric acid, .	7.0.	5.0.	

Highly electric; native form, prism, with sides deeply striated.

ZIRCON.

	Jacinth.	Jargoon.	
Zirconia, . .	7.0.	66.0.	Sp. gr. 4.5; h. 7.5.
Silica, . . .	25.0.	31.0.	
Oxide of iron,	0.5.	2.0.	

As before observed, there is no fixed law among dealers in regulating prices. They have always been extremely arbitrary. Cellini, in his Orificenia, gives their comparative value, in 1560, in the following language, viz.: "The ruby of one carat in weight, 800 gold scudi;* emerald, 400; the diamond, 100; sapphire, 10."

Mr. King says he had seen a perfect ruby of three carats, which sold for $1500. A diamond of the same weight would be worth $450. Another ruby was sold for $5500, which weighed only eleven grains. The ruby of Rudolf II., which De Boot says was bought for $150,000, was sold far below its present value. It was as large as a small hen's egg, and of perfect quality. The King of Ava has one of the same size, and of immense value.

Pastes.

The business of making false precious stones from strass, or paste, is immense; and three fourths of all the world are deceived by the perfect counterfeit. Even the celebrated ruby of Charles the Bold is now proved to be nothing but paste, though he paid nearly half a million dollars for it, and died without knowing the imposition. In New York millions are annually swindled from the people by the sale of what are called "California" diamonds, which are either paste or rock crystal, as no diamonds are found on the Pacific coast. The composition of strass, which forms the basis of all precious counterfeits, is —

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* The gold scudo (eight to the ounce, Roman) was equal to nine shillings in intrinsic value — 1560. The King of Ava has *one as* large as a hen's egg, and priceless, according to modern *laws of trade.*

Litharge,	5.00.
White sand,	5.75.
Potass,	0.05.

TO MAKE SAPPHIRE.

White strass,	2.50.
Oxide of cobalt,	3.74.

TO MAKE EMERALD.

Strass,	250.00.
Copper, green oxide,	2.51.
Chrome ox.	0.11.

TO MAKE BERYL.

Strass,	187.50.
Antimony glass,	1.32.
Cobalt oxide,	0.082.

TO MAKE TOPAZ.

Ceruse of clichy,	50.00.
Quartz pebbles, calcined,	50.00.

"Strass" is the name of the German chemist who discovered it; but recent discoveries by Parisian chemists give a far superior composition. By a mixture of borax, a paste (the "diamant de bore") is produced as hard as quartz, defying the file, and, when set in gold, is not to be distinguished by the best judges from the true diamond. This assertion of Barbot is certainly an error, and confirms former opinions of his credulity and want of judgment.

APPENDIX.

A.

(*See page* 178.)

The following table gives the statistics of crime in 1860 and 1870 — in the latter year for frauds on the Internal Revenue and Post Office Departments only, as the census returns are yet in the press.

STATES.	Convictions in 1870, in Internal Revenue Department from Attorney General's Report.	Post Office Convictions.	Revenue Suits pending.	Convictions for all other Crimes in 1860.
Massachusetts. .	23	2	19	12,732
New York. . . .	142	6	1177	58,067
Pennsylvania. .	47	2	188	2,930
Georgia.	5	3	39	251
Ohio.	155	7	118	4,898
Illinois.	72	4	75	819
California. . . .	6	—	23	935
Kansas.	16	6	3	24

This exhibit of the moral status of the different sections is altogether unexpected by every one. The great excess of crime in New York and Massachusetts is mainly attributable to their being principal centres of foreign immigration, where all the European convicts are spawned on our shores by ur scrupulous governments, which should be promptly rebuk by our Executive.

B.

(*See page* 178.)

Near the centre of the city of Atlanta is a valuable mir spring, which has been analyzed by Dr. A. Means, with following results: —

Temperature	66°
Quantity per hour	32.5 gallons.

Its gaseous contents are, —

Carbonic Acid Gas	9.96 cub. inc
Hydro-Sulphuric Acid	1.83 " "
Atmospheric Air	1.5 per cent.

Its solid contents are, —

Iron as proto-carbonate suspended in carbonic acid gas	13.32 grains.
Sulphate of Magnesia	11.84 "
Carbonate of Magnesia	4.15 "
Sulphate of Soda	8.82 "
Chloride of Sodium	16.06 "
Lime, a trace.	
Silica, not estimated.	
Total solid contents	55.11 grains.

in one gallon of water, constituting it a mineral water o: value, not only from its variety of minerals, but from tl that the iron is suspended in the carbonic acid gas, ar *becomes an* agreeable and most valuable restorer of *corpuscles and* muscular strength.

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